The Newspaper of Information Systems Management
January 31, 1994, Vol. 28, No. 5, 160 Pages, $6/Copy, $48/Year

COMPUTERWORLD

Open AppWare picture clears

Competing object models supported

By Melinda-Carol Ballou and Elisabeth Horwitt

■ Novell, Inc. last week beefed up promises to make AppWare a truly open application development environment by agreeing to support key industry specifications to ensure interoperability among multivendor systems.

AppWare software layers will ensure application interoperability across different vendor flavors of the Common Object Request Broker Architecture as well as Open Database Connectivity and OpenDoc, Novell spokesmen said. But Novell really bit the bullet when it promised to support rival Microsoft Corp.'s Object Linking and Embedding 2.0, including a future distributed version.

> **"We're always going to have a diverse mix of hardware and software, and we want it all to interoperate."**
>
> **— Don MacDonald, Chemical Bank**

With OLE and CORBA support, AppWare has the potential to bridge bewildering, incompatible and competing object technologies for developers.

Novell also added to its roster of third parties committed to creating AppWare Loadable Modules. ALMs are blocks of application code that can be strung together using Novell's fifth-generation language, Visual AppBuilder.

AppWare, scheduled for general release in May, was designed to eliminate the complexity and grunt work involved in building applications that run across a broad range of client and server platforms.

Last week, Novell extended its commitment to open systems to the following technologies:

- An ODBC ALM, said to simplify writing applications that

Open AppWare, *page 10*

Workplace OS beta delayed

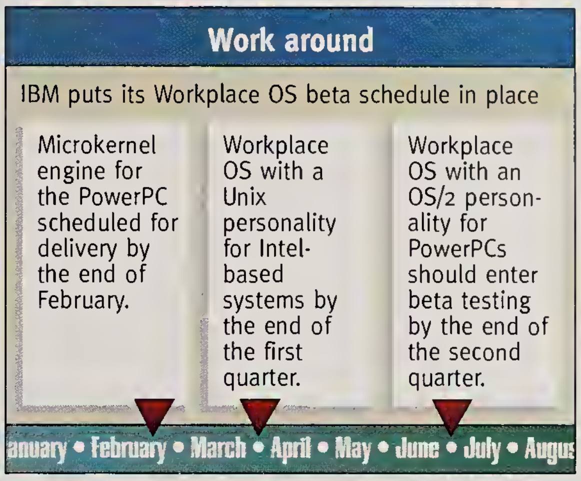
IBM adds Taligent device drivers, buys time for PowerPC debut

By Ed Scannell
and Stuart J. Johnston

Late into the game plan, IBM has decided to incorporate Taligent, Inc.'s object-oriented device driver model into its Workplace OS/2, a move that will set back a beta release of the much-anticipated operating system by at least three or four months to late in the second quarter.

With a single object-oriented device driver for the Workplace OS and Taligent operating systems, IBM officials say they can build a flexible, device-independent architecture that will let users easily integrate a broad range of existing and more advanced Intel Corp. and PowerPC-based peripherals.

Workplace OS is IBM's microkernel-based follow-on to OS/2.


Work around

IBM puts its Workplace OS beta schedule in place

Microkernel engine for the PowerPC scheduled for delivery by the end of February.

Workplace OS with a Unix personality for Intel-based systems by the end of the first quarter.

Workplace OS with an OS/2 personality for PowerPCs should enter beta testing by the end of the second quarter.

anuary • February • March • April • May • June • July • Augus

The revamp will also ease the traditionally arduous task of writing efficient device drivers, developers said.

"A delay to incorporate this sort of change is very worthwhile. It cures one of OS/2's nagging problems — its lousy device driver," said Robert Holmes, a PC manager at Southern California Gas. Co.

Moreover, the resulting delay in the delivery of the Workplace OS/2 beta will buy IBM some time, company insiders said. If IBM delivered Workplace OS/2 to developers any earlier, there would be no PowerPC-based systems for them to develop on.

One model

"Our desire is to get our device driver model to be object-oriented and work with Taligent to create just one object-oriented-based-

Workplace OS, *page 18*

Desktop videoconferencing

Intel evangelizes 'telePCs' to masses

By Michael Fitzgerald
WASHINGTON

Intel Corp.'s introduction last week of a low-cost desktop videoconferencing line may have created both a new horizontal application for business users and a reason for Integrated Services Digital Network to exist, information systems managers and analysts said.

But while Intel's new product family provides a strong signal that "telePCs" will be used for videoconferencing, time and other significant obstacles stand between the idea and its fruition, users and analysts said.

Intel's ProShare Personal Conferencing software and separate ISDN-dependent Video System 200 add-in boards are aimed at enabling corporate America to easily add desktop videoconferencing to its millions of PCs.

Cooperating with Intel in its venture are most of the major video teleconferencing vendors and a host of other partners, many of

Intel, *page 12*

MANAGE MY INVENTORY OR ELSE!!

First it was EDI, then it was bar codes. Now those demanding "power retailers" are sending "letter bombs": They tell suppliers to take the responsibility for managing the retail inventories of their products — or lose the account.

Management, Page 93

Newspaper

Net management gaps irk users

By Lynda Radosevich
WASHINGTON

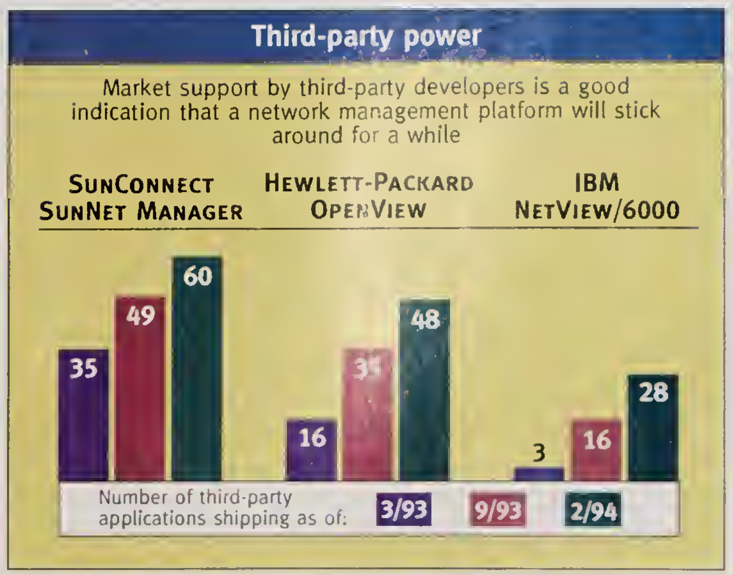
User prospects for patching together integrated, enterprisewide network management systems improved somewhat last week as developments introduced at the ComNet conference here helped to fill various technology gaps.

Progress included software links for traditionally distinct PC, Unix and legacy network management systems; bridges for adding systems management capabilities to network management platforms; and improved applications for tracking physical network changes. Advancements in the wide-area arena included tools for creating telecommunications management applications and standards efforts.

While network managers at the show applauded the individual products, they said today's tech-

Net management, *page 14*

COMNET '94
▶ See coverage pages 14 and 18


Third-party power

Market support by third-party developers is a good indication that a network management platform will stick around for a while

Source: Brandywine Network Associates, Cinnaminson, N.J.

Recent events suggest the administrative burdens of your network could grow substantially.

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Robert D. Holmes

"All Microsoft has going for it is the Windows brand name."

Michael Drips

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■ **Digital**'s year-old vertical market strategy was left in the dust of the latest reorganization. *Page 4*

■ **Object technology** matures, but developers struggle over approaches. *Page 6*

■ **ComNet attendees** agreed that widespread use of ATM is still several years away. Meanwhile, carriers expand their broadband offerings at the show. *Page 14*

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■ **Interlink** offers an alternative to **IBM** for connecting SNA and TCP/IP. *Page 77*

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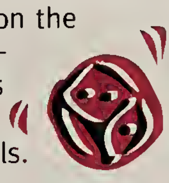
COMING UP NEXT WEEK

JACKPOT? The boom in computer-enabled gambling — from new state lottery games to "telegambling" on the information superhighway — worries antigambling groups and raises new ethical questions for IS professionals.



COMMENTARY

■ IBM's comeback gives **John Gantz** an uneasy feeling that IBM may just repeat earlier mistakes. *Page 35*

■ OLE is no longer the only game in town, as competitors challenge Microsoft, **Charles Babcock** observes. *Page 6*

■ **Carole Patton** is fed up with the numbers games played by PC software vendors. *Page 40*

■ IS managers will be in trouble if they don't recognize that business process re-engineering is real, **Frank Monteleone** says. *Page 35*

■ Keep an eye on how your vendors are doing in the overseas markets before placing too much confidence in them, **Ted Krum** warns. *Page 87*

■ Big iron is proving that it has a role to play in a client/server world, **Bill Laberis** says. *Page 34*

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Executive Briefing

EDI and bar codes aren't enough. Retail powerhouses are now demanding that their suppliers manage the **retailers' inventories**. If the suppliers won't do it, the retailers will take their business elsewhere, and IS in the supply sector is being called upon to keep that from happening. *Page 93*

Re-engineering the business process continues to top the list of issues that IS management has to deal with, according to an annual survey by CSC Consulting Group. Other key issues include aligning IS with **corporate goals** and effectively **organizing and using data**. *Page 8*

Novell's promise of easy support for emerging object standards sits well with corporate developers. Meanwhile, the addition of object-oriented technology to **IBM's Workplace** OS will slow beta delivery of that operating system. *Page 1*

With no internal research and development group, NordicTrack relies on independent inventors to create product ideas and an **imaging and work-flow system** to deal with those inventions. *Page 71*

Managing enterprise networks just isn't as easy as it should be, according to users who say that **network management products** announced last week fill only some gaps. *Page 1*

The simple approach to systems sometimes just doesn't work, as food processor **J. R. Simplot** discovered before it automated its inventory systems. *Page 83*

LAN administrators have to do more than keep address books for E-mail users. They are taking on higher-level **management skills** that require greater commitments. *Page 133*

GOSIP may be on its deathbed as an open systems standard for government users, which suits some users just fine. *Page 77*

Experience with the emerging information highway was one of the key factors that landed Encarnacion Hernandez the job as chief information officer for the **Silicon Valley** city of Sunnyvale, Calif. *Page 8*

It took almost a year, but AMR Corp. landed its first major contract to supply excess **network capacity** to a nonairline customer, National Farmers Union Insurance Cos. *Page 18*

IS has a key role in planning call centers, such as those supporting **telemarketing operations**, but IS is often brought in too late. *Page 96*

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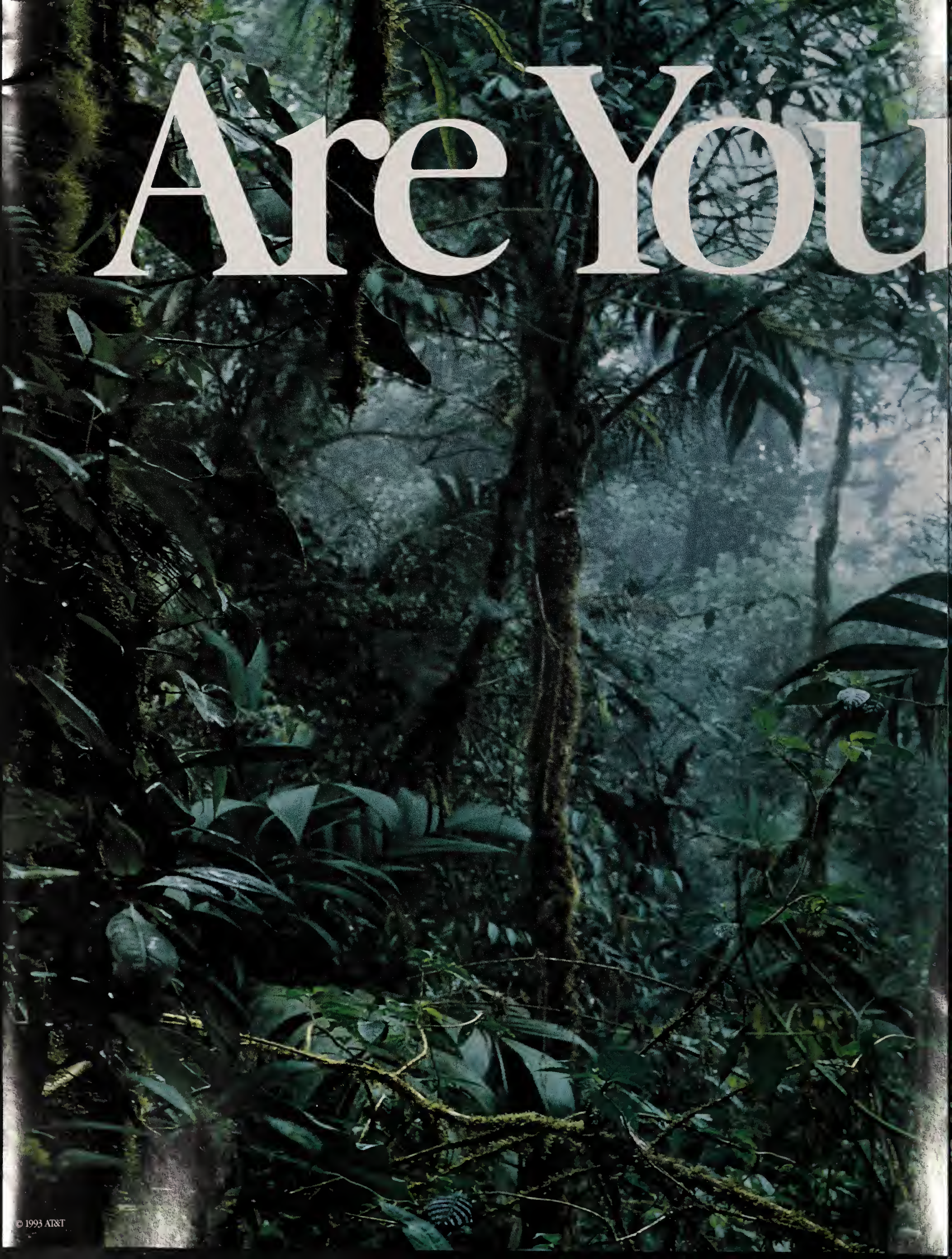

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Network Systems

HP fortifies host/Unix transaction link

By Jean S. Bozman
CUPERTINO, CALIF.

Hewlett-Packard Co. last week said it bridged an important gap between Unix systems and IBM mainframes by releasing utilities and reliability features for software services required to build distributed transaction-processing systems.

It also added ease-of-use, security and management features to the HP DCE/9000 distributed computing development tools.

HP is using technology licensed from Transarc Corp. — Encina transaction monitor and Encina core services — to help users connect IBM mainframes with Unix servers in enterprise networks. It is also adding data-integrity software to the layered HP Encina/9000 server software it introduced in June (see box).

In making its announcement, HP beat IBM to the punch. IBM also licensed Transarc's Encina transaction-processing technology and will integrate it with its own Unix distributed computing products. IBM is planning to announce its DCE/Encina plans by summer, sources said.

Listening to complaints

Users have often complained that Unix servers are not reliable or secure enough to host mission-critical applications. That is why, analysts said, the Open Software Foundation's Distributed Computing Environment (DCE) and Encina utilities are a vital part of users' plans to migrate mission-critical applications from IBM mainframes to various brands of Unix servers.

"I think the important aspect of this is that we're seeing DCE become more and more real," said Rikki Kirzner, a principal analyst at Dataquest, Inc. in San Jose, Calif. Early adopters of DCE, such as Charles Schwab & Co., are starting to do production work with the environment, said Steven Wendler, a vice president at Gartner Group, Inc. "And Encina [technology] represents mission-critical applications on top of a distributed computing environment."

In the spotlight

Highlights of HP's distributed computing announcement include the following:

- **HP Encina/9000 PPC (Peer-to-Peer Communications) Gateway** ensures mainframe-to-Unix data integrity. Priced from $3,900, it is slated to ship in April.
- **HP DCE/9000 Secure NFS-DFS Gateway** allows remote NFS clients to dial into a secured server. Priced from $2,000, it ships in February.
- **HP DCE/9000 Global Directory Service,** for all networked DCE "cells."
- **HP Encina/9000 Recoverable Queueing Service** allows users' transactions to be processed asynchronously.
- **DCE Configurator** allows Unix systems administrators to manage their DCE services.

But HP said it is first with Unix-to-mainframe links that ensure, through two-phase commit, that transactional data shipped from mainframes to Unix servers will safely reach its destination. HP has also built security features on top of DCE's Distributed File System to link workstation clients to secure Unix servers.

Minding the transactions

HP Encina/9000 characteristics

Monitoring software	Encina transaction monitor
Queuing software	Recoverable queuing service
Gateway software	Peer-to-peer links with two-phase commit
Operating platform	Encina Server Distributed Computing Environment — HP DCE/9000 HP/UX

Getting there first

"I think HP's point is they were there first with a function that supports two-phase commit between CICS on the mainframe and the Unix servers," said John Schiller, Encina marketing manager at Transarc in Pittsburgh. "In time, we will see the Encina peer-to-peer communications on other platforms." Vendors other than IBM that have also licensed the Encina transaction monitor and core services include Stratus Computer, Inc. and Siemens-Nixdorf AG, Schiller said.

One early user of HP's DCE/9000 tool kit is Wells Fargo Bank in San Francisco, which is prototyping a DCE "cell" of IBM, HP and The Santa Cruz Operation Unix servers that run Oracle Corp. databases. The Unix servers will be updated by an IBM mainframe running IBM's DB2 relational database, said Tsvi Gal, a bank vice president of information technology.

"Our goal is to enable interoperability and access to data, wherever it is," Gal said. "It could be on any of the 35 flavors of Unix. It could be on [IBM mainframe] MVS, or it could be on Tandem [Computers, Inc.'s] Guardian."

Wells Fargo's pilot will not go into production until the OSF delivers DCE 1.1 this summer, he said, and until Wells Fargo chooses a transaction monitor. HP's DCE/9000 and Encina/9000 can work with Transarc's Encina monitor or IBM's CICS monitor. But DCE users are still missing some pieces of transactional computing: CICS support is still due from HP, and IBM will deliver more DCE and Encina support for IBM mainframes. "Right now, Encina is the only DCE-compatible transaction monitor that exists," Gal said.

IBM already has connectivity between the mainframe-based IBM CICS transaction monitor and the IBM CICS/6000 monitor that runs on IBM RS/6000 Unix machines, said Dan Cox, product manager of IBM's High-Availability Systems group in Austin, Texas. "We have DCE and CICS and Encina on an RS/6000 that compares very nicely with the HP solution," he said, explaining that all three run on IBM RS/6000 High-Availability Clustered Multiprocessors.

Distributed computing

Banyan ENS extends HP/UX's reach

By Elisabeth Horwitt

Banyan Systems, Inc. invaded the Unix distributed computing market last week by shipping its Enterprise Network Services (ENS) for Hewlett-Packard Co.'s HP/UX.

ENS will provide HP customers for the first time with a set of global services capable of supporting hundreds of users on a single server and transparently linking client systems to server resources throughout the enterprise, according to Bill Johnson, Banyan's director of product strategy.

However, an HP executive threw a wet blanket over Banyan's dreams of dominating the Unix network services market last week by pooh-poohing the Westboro, Mass.-based vendor's claims that ENS will become the primary platform for integrating HP 9000-based client/server resources corporatewide.

Getting what they want

HP views ENS as a choice for users who are looking to "paste discrete LANs together into an enterprise" client/server system, according to Nick Ordon, head of HP's network operating system group. HP's current offering, LMX, and Novell, Inc.'s Portable NetWare for Unix lack global directories and support a limited number of clients. Portable NetWare is based on the 3.11 version and will not support NetWare 4.x until late 1994 or early 1995, Ordon said.

HP's primary global directory strategy is based on the Open Software Foundation's Distributed Computing Environment (DCE) and X.500, not Banyan's StreetTalk III, Ordon said. "We want something standardized and agreed on by the industry; Banyan has wonderful technology, but it is not pervasive at this point."

Indeed, DCE is the long-term enterprise service strategy for most leading Unix vendors, said Rikki Kirzner, a principal analyst for Unix systems software service at Dataquest, Inc. in San Jose, Calif. And unfortunately for Banyan, NetWare is already the dominant network operating system platform among Unix shops, she added.

On the other hand, support of ENS seems to be making HP/UX more attractive to staunch Banyan shops. "Support of ENS was one of our criterion for selecting an application server," said Keith Johnson, assistant vice president of technology at Continental Grain Co.

However, Banyan has yet to perfect integration between the Unix and ENS sides of enterprise services, Johnson said. The vendor has begun to address this need with integration offerings such as Intelligent Messaging for Unix, which is said to support message exchange between StreetTalk III and UnixMail. In addition, by year's end Banyan plans to have clients access Vines servers via native TCP/IP in addition to Vines Internet Protocol, Johnson said.

Upcoming support

ENS currently runs on HP/UX and Novell's NetWare and will support Sun Microsystems, Inc.'s Solaris and IBM's AIX later this year.

Upcoming integration

Oracle Corp. and Sybase, Inc. are integrating databases with ENS so clients can access them via StreetTalk and Vines Internet Protocol. Oracle integration is due in mid-February to early March; Sybase's integration time frame is less specific.

Major savings

One major advantage of Banyan's ENS is its ability to reside with HP/UX-based application services on a HP 9000 box, users said.

Being able to amalgamate network and application services on one RISC box can mean major cost savings — in support even more than in hardware — for small branch offices that cannot afford a local systems administrator, said Lloyd Dunham, director of information systems at Falconbridge Ltd., a Toronto mining company.

This differentiates ENS from the HP PA-RISC version of Novell's Processor Independent NetWare, a native hardware implementation due out this quarter.

Novell hopes to have NetWare reside with Unix in a year or two when microkernel technology is more advanced, a company spokesman said at a recent briefing.

The ENS for HP/UX base license includes security, management, StreetTalk, client software and file and print services. Options include Network File System support, Telnet over Vines Internet Protocol, messaging and routing. Pricing ranges from $4,995 for ENS services on an existing HP/UX server to $54,995 for a 1,000-user version.

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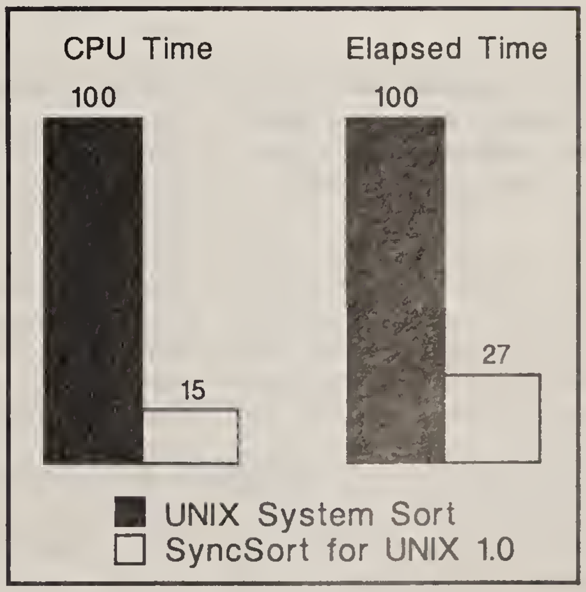

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Digital veers from vertical structure

Newly formed unit will take over marketing and planning for Alpha AXP line

By Craig Stedman

Digital Equipment Corp. last week formed a systems business unit to take the lead role in marketing and product planning for the Alpha AXP computer line, moving away from a year-old vertical market strategy that analysts said did little to reverse the company's sliding fortunes.

Edward Lucente, vice president of worldwide sales and marketing, said in an internal memo that the systems unit will "complement, not replace, [our] industry marketing programs." However, a Digital spokesman said the systems unit will become the main bridge between engineering and the sales force.

Structural changes

Profit-and-loss responsibility has also shifted from the vertical market groups to the systems unit, according to the spokesman. Moving into the future, the structure of the vertical groups "may be different from what you see today," Lucente added.

The reorganization came one week after Digital reported a larger-than-expected second-quarter loss that was accompanied by a 16% decline in product sales [CW, Jan. 24]. The Digital spokesman said there was no direct cause and effect between the restructuring and the company's performance during the quarter.

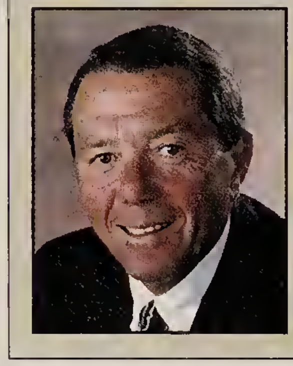
The changes appear to signal "a total disempowerment of the [vertical market] concept," said Lynn Berg, an analyst at Gartner Group, Inc. in Stamford, Conn. She and other analysts applauded the move and said the vertical strategy was flawed because it took Digital's eye off the product ball.

Digital has been marketing Alpha more as a generic technology than as a set of specific products, Berg noted. "The concept of going to Digital for, say, a database server is completely foreign," she said. "There's been no focus on the day-to-day things that people would actually buy."

"It's a return to focusing on shipping the boxes that users are paying for," agreed Dennis Schneider, president of OnPoint Marketing, Inc., a Nashua, N.H., consulting firm. "If you're an installed base customer, you can find somebody whose [profit and loss] depends on keeping you happy. You couldn't do that before."

A bigger slice

Digital's latest reorganization gives vice president Edward Lucente, who joined Digital last April, full control over systems marketing and corporate sales operations



FUNCTIONS REPORTING TO LUCENTE INCLUDE:
- Systems business unit.
- Customer/industry marketing units.
- Direct sales organization.
- Indirect sales channels.
- Corporate communications.

Bright spots

George Reid, MIS director at Sanford C. Bernstein & Co. in New York, noted that the PC and storage product units set up previously by Digital have been bright spots for the company. The formation of a similar unit for Alpha systems sounds like a good idea for both Digital and users, he said.

"It's going to be a little bit clearer shot to get ourselves heard as to what needs to be done" on Alpha machines, Reid said. He added that the vertical market focus seemed to present "mixed messages to the product people" at Digital because each vertical unit had its own priorities and interests.

Raymond Sasso, chief information officer at J. R. Simplot Co. in Boise, Idaho, was less optimistic about the benefits of the new structure. "To tell you the truth, I haven't seen a bit of a difference from all the reorganizations over the years, which may be a message to Digital in itself," Sasso said.

Sasso added that he hopes Digital will now take a break from reorganizing because the changes "are enormously disruptive" to the company's field employees.

Reid agreed that Digital is at risk by "creating the impression that they're somewhat at sea, setting it up one way and then another way."

Part of a greater plan

A memo released to Digital employees described the reorganization as part of "a plan for greater emphasis on systems revenue." The company spokesman said the vertical groups have been useful for signing up application vendors, "but we kind of lost emphasis around the core systems."

The systems business unit takes a product marketing group created last fall and gives it expanded responsibility for product management, business planning and channels development, Digital said. The unit consists of five product groups focused on client/server software, OpenVMS systems, Unix and Windows NT systems, network products and memory and peripherals upgrades.

Vertical drop

One of the five vertical market units set up by Digital last year after Robert Palmer took over as company president is completely disappearing from the organization chart as part of the reorganization. What had been the health care unit is being folded into two of the other four groups, the company said. The pharmaceuticals industry will now be covered by the consumer and process industries unit, while hospitals and other medical users will move into financial, professional and public services. The other two vertical groups still in place include one for defense and manufacturing industries and another for the education, communications and media markets.

Overseas markets still hurt Digital's results. See column on page 87.

NCR loses name, gains AT&T moniker

By Tom Hoffman

After AT&T acquired NCR Corp. three years ago, it was only a matter of time before NCR lost the last link to its 110-year-old legacy — its name.

Last week, the $7.26 billion AT&T computer unit was officially dubbed AT&T Global Information Solutions to better reflect efforts to merge its communications and computing expertise. The new moniker will replace the NCR brand name on most products, except for equipment that has historically been associated with the Dayton, Ohio-based vendor, such as its automated teller machines and retail point-of-sale systems.

The new tag is not linked to the unit's four-month-old restructuring effort, company officials said.

Slimming down

Since taking the helm of NCR last year, Chairman and Chief Executive Officer Jerre Stead has reduced the company's payroll by 2,400 employees, created 530 customer-focused teams and taken a $120 million fourth-quarter charge to handle future downsizing and restructuring.

Instead, the name change is based on five years of customer surveys and a reevaluation of the company's strategic direction. "We wanted to learn what name best represented our communications and computing capabilities," said Bill O'Shea, senior vice president of worldwide marketing for the newly designated group. "We think it reflects who we are and who we intend to be in the future."

Several NCR customers agreed. "AT&T spends a lot of money on name recognition. It only stands to reason that they would try to take advantage of that," said David Barrett, vice president of information technology at Invesco Funds Group, Inc., a Denver-based mutual funds brokerage and an NCR 3600 shop.

"I think it makes a lot of sense for them, given their global presence and solutions orientation," said Chris McCann, vice president of operations at 800-Flowers, a Westbury, N.Y.-based floral telemarketer that uses NCR 3450 and NCR 3550 machines to handle order-entry processing.

NCR CEO *Jerre Stead has taken charge of downsizing and restructuring*

Welcome change

In general, industry analysts welcomed the name change, which they felt better characterizes NCR's attempts to blend AT&T's network computing savvy into its own product set. But "old habits die hard," pointed out Michael A. Goulde, a senior consultant at Patricia Seybold Group in Boston. It will likely take years before some people stop equating point-of-sale machines with the NCR rubric, he said. "If you look at the Unisys name, that took years to settle in and make people feel comfortable," Goulde added.

Corrections

A story in the Jan. 10 issue incorrectly identified Tim Boudreau. He is a consultant at Andersen Consulting.

A news short on NCR Corp.'s early retirement program in the Jan. 10 issue incorrectly stated the number of U.S. employees that have accepted NCR's early retirement offer. About 2,400 of the 5,500 NCR U.S. employees offered early retirement have accepted the program thus far.

A product brief on a new release from Poet Software Corp. in the Jan. 10 issue carried the wrong phone number. The number is (408) 970-4640.

The Jan. 17 Buyers' Satisfaction Scorecard on spreadsheets incorrectly stated that only users of Quattro Pro 5.0 and Excel 4.0 were surveyed. More than half the users of those products and Lotus 1-2-3 for Windows were using the latest versions. The rest were using older versions. The differences between the ratings for the latest versions and the published ratings were not statistically significant.

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ORACLE

OLE's no longer the only game in town

Microsoft has gotten off to a fast start enhancing Windows applications with its Object Linking and Embedding (OLE). But even as OLE 2.0 wins converts, Microsoft faces a challenge from a broad alliance of competitors.

Microsoft made a number of trade-offs in coming up with the mixed bag of technical solutions represented by OLE. Meanwhile, a number of large systems vendors sensed the potential of object-based systems and formulated their own direction, adhering more closely to the basic precepts of object-oriented development.

Hewlett-Packard, Sun, Digital and IBM had all done extensive research on the use of objects before OLE emerged. Now, having witnessed OLE's fast start, they have architected their own approach to competing on the object-oriented front.

As customers begin to design client/server systems, they will have a choice between Microsoft's approach, which springs from the use of objects in single desktop applications, and a larger system approach that seeks to create pools of shared objects.

The Meta View

OLE faces some stiff competition from the large systems sector.

Charles Babcock

The contrast is clear when you compare IBM's System Object Model (SOM) with Microsoft's Common Object Model (COM). Systems built on an object-oriented basis require defined classes of objects, with the subordinate objects in a class inheriting characteristics from a parent object. IBM's OS/2 Workplace Shell relies on SOM to support its object hierarchy. OpenDoc, an OLE-like compound document architecture being built by Apple, WordPerfect, Borland and Sun, will have advantages in the long run over OLE because it too is based on SOM and will follow the rules of object inheritance. One of the benefits of object-oriented development — code reuse — springs from the principle of inheritance.

IBM, Sun, Digital, Apple, HP and others, sensing the potential for customer dissatisfaction if inheritance were lost between systems, agreed on a Common Object Request Broker Architecture (CORBA) and are working on standards for other object services through the Object Management Group. SOM is CORBA-compliant and has the potential for allowing heterogeneous systems to exchange objects. COM and OLE are not CORBA-compliant.

SOM is also language-neutral, meaning objects could be called by Cobol or C statements as well as C++, reflecting the mixed environments and large systems background of its sponsors. COM leans heavily toward C++. If a system designer chooses some language other than C++, he will have to create the virtual function tables that would be automatically created by a C++ compiler.

Microsoft's OLE developers confronted the inheritance issue and concluded that one Windows programmer was unlikely to know all the assumptions that went into another developer's objects. To ensure object interaction, they required pointers to be built into IUnknown, the common interface of each OLE object. The pointers make the connections explicit between related objects. "We have internal plumbing so objects can be aggregated. It serves the same function as inheritance," says David Seres, Microsoft's OLE product manager in Redmond, Wash.

There is little doubt that OLE has expanded the vocabulary of Windows programmers, but whether its simulated inheritance will suffice for future object-oriented development remains to be seen.

IBM and its allies are trying to fire up an object locomotive on the same track as Microsoft's speedy handcar. Sooner or later the developers pumping OLE 2.0's handles will have to ask themselves whether they shouldn't pay more attention to that deep-throated whistle behind them. (See related article, top right.)

Babcock is *Computerworld*'s technical editor. His MCI Mail address is 575-2737.

Developers, OS providers debate which object model to build on

By Michael Vizard

PALM SPRINGS, CALIF.

■ While most software providers agree that object technology will advance the art of application development, the software industry is still coming to grips with how it will be adopted.

In general, PC application providers such as Lotus Development Corp. and WordPerfect Corp. said last week at Demo '94 that they expect the industry to gravitate to a suite model under which customers will purchase a suite of highly integrated objects from their favorite PC software vendor.

But other players in the industry, such as IBM, say the impact of object technology will be much broader. They envision a world where object components can be easily matched to create highly tailored applications for end users. As such, customers will not order suites of objects but will simply describe the application they require. Using this description vendors will then build a custom application using object technology.

D·E·M·Ô

Microsoft Corp. executives, meanwhile, noted that today's suites are already moving toward an object format with Object Linking and Embedding 2.0, but they are unsure around which of the two models the industry will coalesce. "Anybody who tells you they know how this will work out is a liar. You'll see objects in suites first. The rest will evolve over the next four to five years," said Chris Peters, vice president of Microsoft Office.

End of an era

Driving this debate is the general move to object-oriented operating systems over the next two years. Microsoft, IBM and a number of Unix vendors have outlined infrastructures for object-oriented operating systems that will essentially bring the days of purchasing discrete monolithic applications such as word processors, spreadsheets and presentation graphics packages to a close.

That is because eventually, instead of buying shrink-wrapped applications, users are expected to purchase a core set of objects from which they will build custom applications.

For example, IBM is touting a vision of its Taligent operating system that consists of a number of frameworks that can be licensed by any corporation or software developer for use as components in a vertical application.

Once these engines are available in what IBM calls a foundry, developers will be able to license them for use in their own highly customizable vertical applications, said John Patrick, IBM vice president of sales and marketing.

But many PC application providers, such as Lotus and WordPerfect, argue that corporations will not be interested in purchasing individual object components to create these customized applications. Instead, they will purchase suites of objects from PC software developers, which will become the base platforms for building these applications.

Priscilla Tate, executive director of the Technology Managers Forum International in New York, said she doubts corporations will be interested in object technology that results in component architectures where corporate developers still have to license different core engines. "Operating systems in the PC world just don't go far enough. Every application uses that same core elements, so putting engines in the operating systems would be really welcome," Tate said.

Bundling on the way

David Coursey, editor of "P.C. Letter," said he expects commonly used components of applications, such as text, math and charting engines, will be bundled into object-oriented operating systems as more existing operating system services get pushed into hardware.

As such, corporate developers could apply common text, math and charting engines to every application they build. But PC software providers say support issues, user interfaces and ensuring object compatibility will push IS shops to rely on outside vendors for their applications.

Yet "as the engines become - commodities, there will still be issues such as which user interfaces, how objects interact with each other and support that will make people want to buy suites from single vendors," said Lotus Chief Technology Officer John Landry.

In either model, the advent of object technology is expected to be a boon to in-house application development at IS shops. "The real beneficiaries [of objects] is definitely going to be corporate developers," noted Jeff Tarter, editor of the "Soft Letter" newsletter in Watertown, Mass. "They already purchase class libraries, and objects will be sold like class libraries."

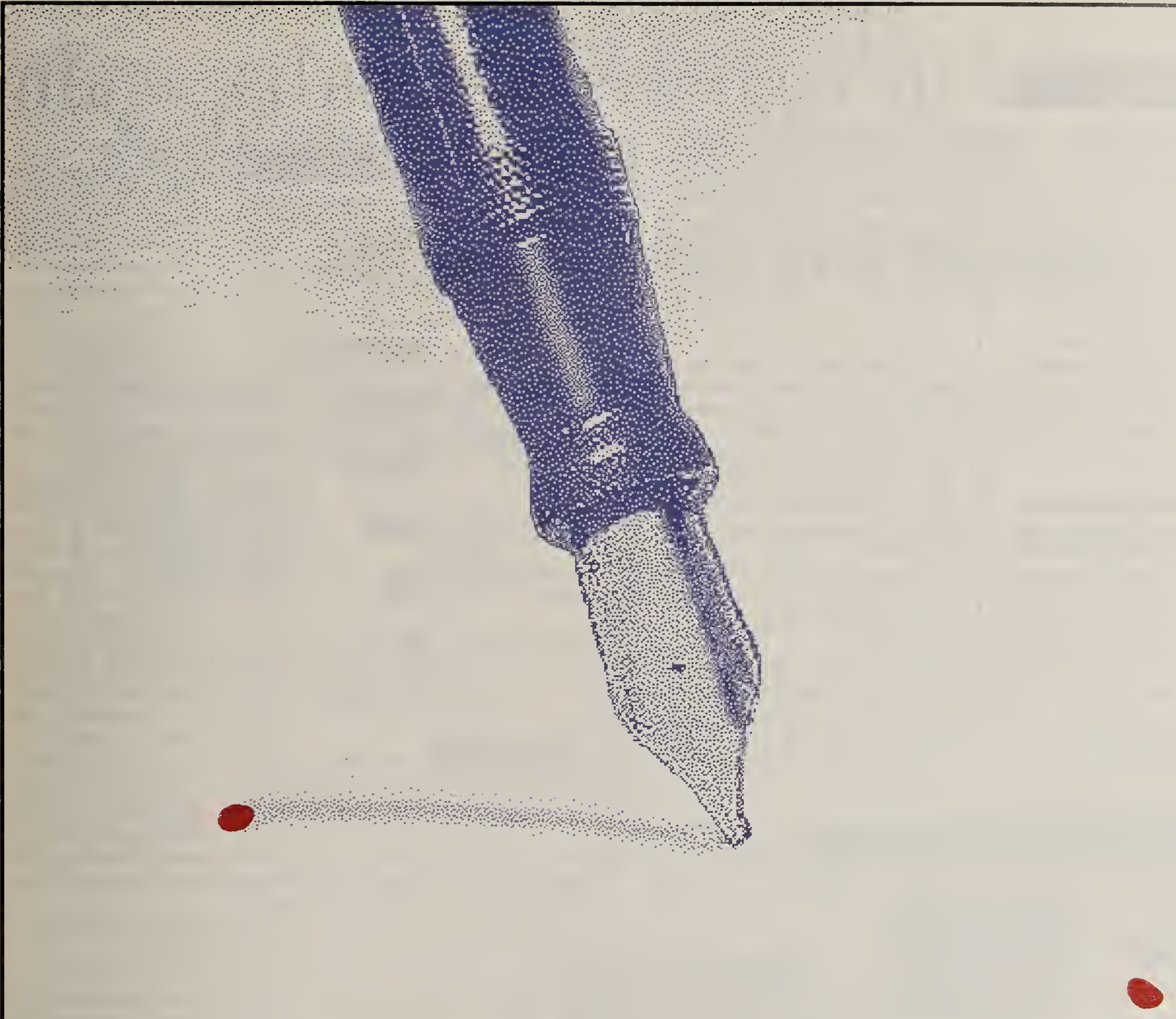
"Even if you save corporate developers one-tenth the time it takes for them to create an application, you're talking about saving millions of dollars," said Marc Sokol, director of marketing at Computer Associates International, Inc.

Chicago prototype shown

Microsoft Corp. executives last week took advantage of the Demo '94 conference in Indian Wells, Calif., to once again demonstrate a prototype of Chicago, the company's forthcoming 32-bit preemptive multitasking operating system optimized for Intel Corp. platforms. The watch word, however, was prototype.

Jonathan Lazarus, Microsoft's vice president of systems strategy, ran the prototype on a desktop PC and an I486 laptop, one of four laptops in existence that supports the forthcoming Plug-and-Play standard.

The demonstration showed off Chicago's document-oriented graphical user interface, which in many ways resembles the Macintosh. The prototype featured an integrated file manager, program manager and control panel running under a single shell. — *Michael Vizard*



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News Shorts

IBM earns its keep

One good quarter does not a turnaround make, but IBM's financial results were a welcome relief to the vendor, which last week reported its first quarterly profit in more than a year. Although mainframe sales fell by 30%, IBM said it would have done much better had it not underestimated the demand for big iron by an undisclosed amount, a company spokesman confirmed. Total revenue was $19.4 billion, compared with $19.6 billion for the year-earlier period; gross margins fell by about 1%. Net income was $382 million compared with a loss of $5.5 billion for the year-earlier quarter.

Apple to license Mac operating system

After months of speculation, **Apple Computer, Inc.** Chief Executive Officer Michael Spindler acknowledged last week that Apple will license its Macintosh operating system software to computer makers using the PowerPC microprocessor. A time frame was not given. Apple also announced that it has elected Paul Stern, 55, to its board of directors. Stern is the former chairman and CEO of **Northern Telecom, Inc.**

WordPerfect announces layoffs

WordPerfect Corp. this week disclosed a larger-than-expected layoff program that will encompass 17% of its work force [CW, Jan. 21]. Expected to affect about 1,011 of its 5,950 employees, the program could save the company $40 million annually, according to CEO Ad Rietveld. The recently named CEO said the layoff will cost WordPerfect $33 million, which has already been accounted for in 1993. Despite this charge, Rietveld said, the privately held company remained profitable in 1993.

CA melds PC packages

In an effort to deliver a wider variety of features into a single spreadsheet package, **Computer Associates International, Inc.** has quietly merged its CA-Compete and CA-SuperCalc spreadsheet products into a single package, CA-SuperCalc for Windows. The strategy, which had not yet been announced to customers and industry analysts, will nullify further enhancements to CA-Compete. The combined product, which melds the CA-Compete database and other features into CA-SuperCalc, began shipping in the UK last December and is expected to reach the U.S. market this spring. CA officials confirmed the plans but declined to disclose specific delivery dates or pricing.

Old complaint lives on

Most information systems projects are late, and many come in over budget, according to a survey of financial executives conducted by the **Institute of Management Accountants** in Montvale, N.J. Fifty-five percent of the 350 respondents said implementation projects were completed behind schedule — by five months on average. Likewise, 37% said their IS hardware and software implementation projects came in over budget, typically by 30%.

SHORT TAKES **Hogan Systems, Inc.** last week picked up from **IBM** exclusive marketing rights to the Integrated Banking Applications software family. . . . **NEC Technologies, Inc.** reduced prices on its MultiSync 5FGp monitor, from $1,455 to $1,295. . . . **Silicon Graphics, Inc.** Chairman and founder James H. Clark will resign effective Feb. 28 to "pursue applications software opportunities" in the interactive broadband network and television market. . . . **Microsoft Corp.** has extended its cash rebate program for its Macintosh software, including Office and Works, until March 31.

More news shorts, *page 18*

Re-engineering tops list again

By Allan E. Alter

Re-engineering business processes in general, and a number of business areas in particular, once again topped the list of management issues in CSC Consulting Group's survey of critical information systems issues for 1994.

Released last week, the survey said business areas frequently targeted for re-engineering campaigns — customer service, order processing, delivery/logistics and finance/accounting/billing— scored high on its list of critical information technology investment areas.

In fact, executives tracking the top IS management issues will find few changes from the results of previous years.

Published annually by the Cambridge, Mass., consulting firm, the survey gathered data from IS directors in 556 North American organizations with $250 million in annual revenue.

Same concerns

Repetition at the top of the management issues list is a warning for executives, said Ron Brzezinski, principal at Transformation Associates in Wilmette, Ill. "Re-engineering is an issue because CIOs are not getting successes. I am hearing, 'Gee, I'm doing [total quality management] and business process redesign, and I'm not getting good payback.' "

Two other management issue perennials — aligning IS and corporate goals and organizing and utilizing data — filled out the Top 3 spots. Nearly all the Top 10 management issues are repeats of 1993; re-engineering has placed first in five of the past six years.

Technology trackers will find new items near the top of the list and a few familiar ones that have dropped.

Client/server remained in the No. 1 spot on the critical information technology list, followed by LANs and wide-area networks and electronic data interchange. Groupware, however, plummeted from 15th to 27th.

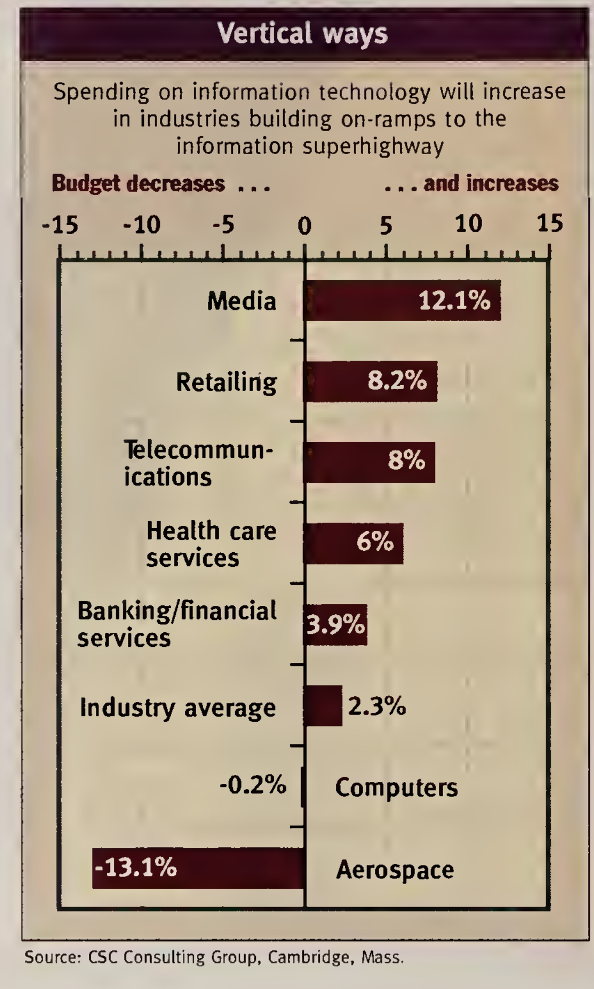
The decline in interest in groupware shows "there's a disconnect between business processes" and how technology is actually evolving in companies, Brzezinski said. "One of the basic principles of business process re-engineering is to put data closer to the process."

Making its first appearance on the list, rapid application development (RAD) tools came in a surprising fourth. Computer-aided software engineering (CASE) tools dropped from fourth to 11th.

The switch reflects user demand for fast turnaround on systems projects, said Laraine Rodgers, vice president and chief information officer for U.S. customer operations at Xerox Corp. in Rochester, N.Y. "You have to be able to name that tune in one note." Unlike the lengthy procedures most CASE tools require, RAD tools enable you "to do a pilot and make the system happen," she said.

Other significant findings included the following:

- The level of IS spending increases continued to decline for a sixth year. The survey measured a 2.3% average increase in 1994, down from 2.5% the previous year (see chart above).
- Imaging, expert systems/artificial intelligence and pen-based computing all dropped significantly on the critical technologies list.



Source: CSC Consulting Group, Cambridge, Mass.

Re-engineering gets real. See column on page 35.

Info highway builder tapped as Calif. city CIO

By Allan E. Alter

Is experience in building information highways a prerequisite for a city government chief information officer?

Thomas F. Lewcock thinks so. He is city manager of Sunnyvale, Calif., considered a model government by the Clinton administration and the "reinventing government" movement.

Lewcock has hired Encarnacion "Shawn" Hernandez, associate vice president for information technology at California State University at Hayward, as his new director of information technology.

Hernandez's top priorities include working on a strategic, long-range telecommunications plan and building an infrastructure so the city can connect to a future information superhighway and provide information to its citizens, Lewcock said.

Other duties

In addition, Hernandez will have to deal with Pacific Bell and cable television operator TeleCommunications, Inc., which plan to offer interactive television and other services in Sunnyvale.

At the university, Hernandez created a fiber-optic network that connects students, researchers and faculty to the library, the campus computing center, the Internet and one another. Students at the Contra Costa satellite campus can even take classes interactively via compressed video, he said.

"That's just the kind of background we need in cities, Lewcock said. "The information highway issues . . . how we link directly with our citizens . . . are coming at us real quick."

Joining in

"There are tens of billions of dollars in corporate America being spent [on building an information superhighway], and it would be silly to assume we do not fit into that," said city manager Thomas F. Lewcock.

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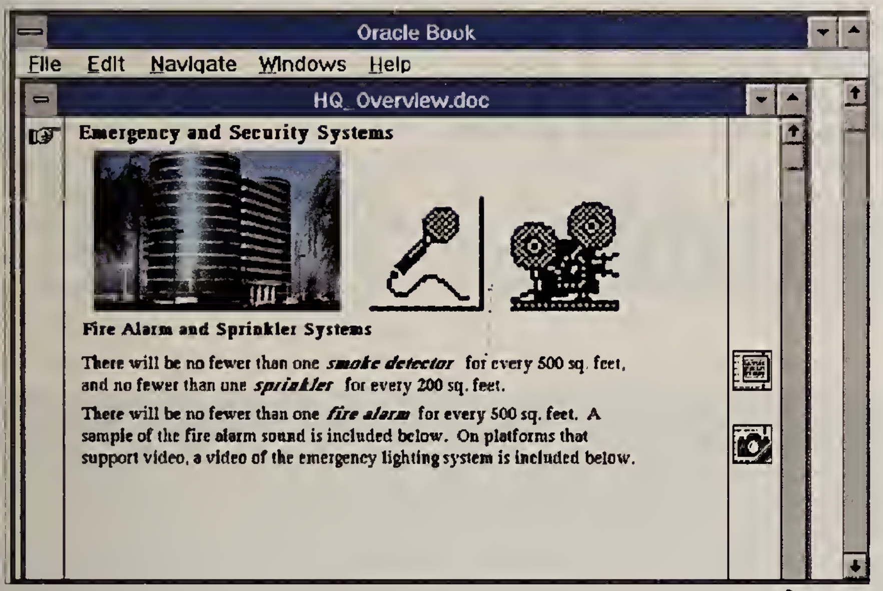

Emergency and Security Systems

Fire Alarm and Sprinkler Systems

There will be no fewer than one ***smoke detector*** for every 500 sq. feet, and no fewer than one ***sprinkler*** for every 200 sq. feet.

There will be no fewer than one ***fire alarm*** for every 500 sq. feet. A sample of the fire alarm sound is included below. On platforms that support video, a video of the emergency lighting system is included below.

This application was designed in Windows, then deployed on Windows, Motif, Macintosh, and even Character terminals without any programming.

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Chris Nicholls
Manager IS Dev.
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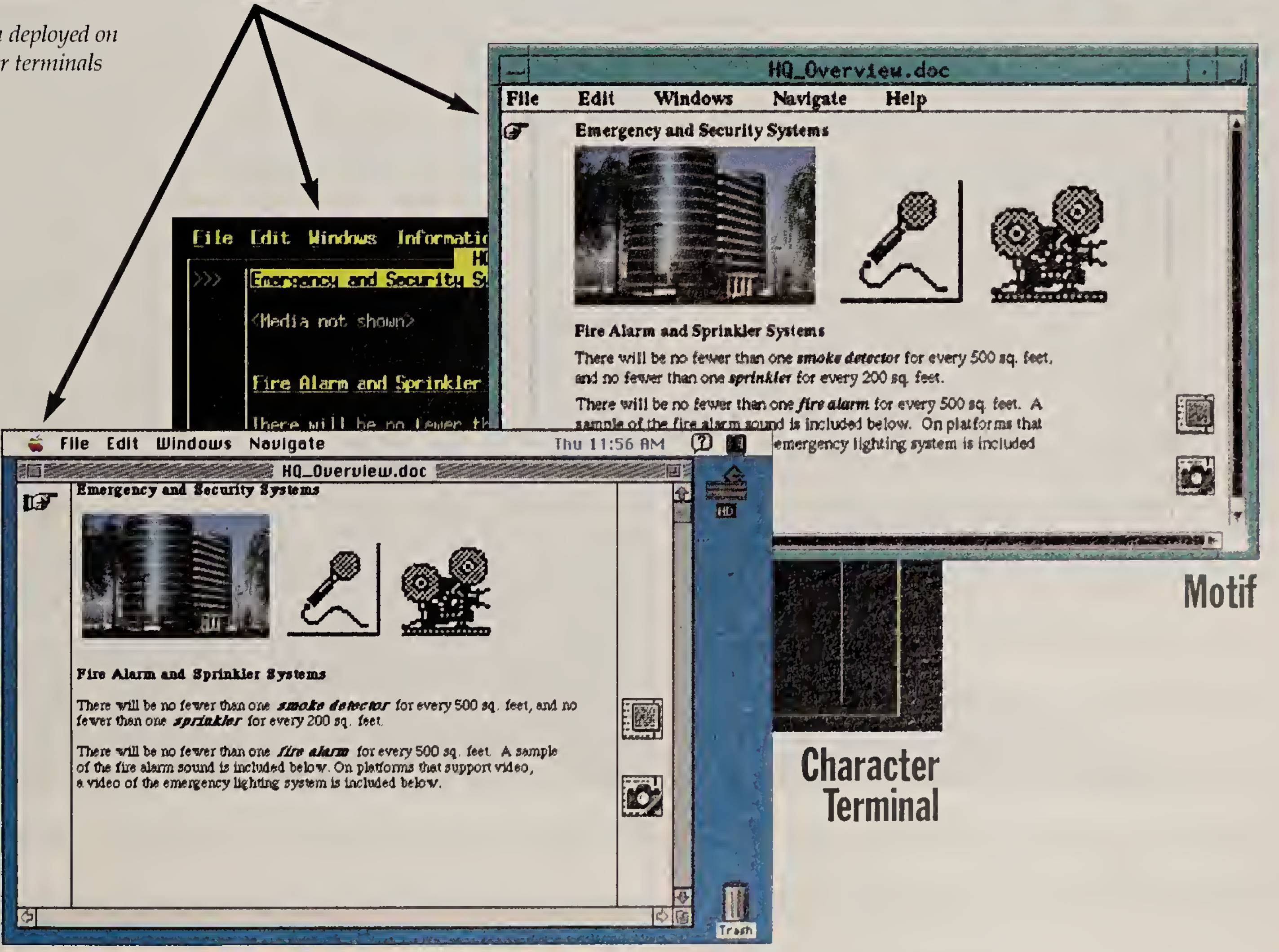

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There will be no fewer than one ***fire alarm*** for every 500 sq. feet. A sample of the fire alarm sound is included below. On platforms that support video, a video of the emergency lighting system is included below.

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Open AppWare

CONTINUED FROM COVER 1

make use of this de facto standard for accessing SQL database servers from a client front end.

- Support for the Object Management Group's CORBA through application programming interfaces (API), an ALM and the AppWare Bus. This will allow AppWare developers to write applications that can call CORBA-compliant objects and systems over a distributed network.
- The Computer Integration Laboratory's OpenDoc, a compound document architecture standard, and OLE will be supported usings APIs, officials said. These APIs will shield programmers from the complexity of OLE and OpenDoc development by condensing the number of calls required to support the specification, they said.

The news appeased several corporate developers who said they will evaluate AppWare.

Developers with large Windows installations, Novell, Inc. NetWare LANs and a range of other platforms are "in up to the elbows" with OLE development work, but they are also seeking the means to unite CORBA with OLE, said Don MacDonald, systems officer at Chemical Banking Corp. in New York.

"I will have a job for the rest of my life trying to get this crap to hang together," MacDonald said. "We're always going to have a diverse mix of hardware and software, and we want it all to interoperate."

He added that he will check out AppWare when it is "real enough" for him to examine. Support for CORBA and OLE, with its 500-odd function calls, is key, especially given that Microsoft has held back from supporting CORBA, he added.

AppWare's upcoming ODBC support is a big deal for AppWare beta tester Lisa Vaz, manager of application development at Stonybrook Laboratories, Inc. in Princeton, N.J., a Mobil Oil Corp. unit.

The laboratory uses Apple Computer, Inc.'s Data Access Language, "which really isn't a standard," to provide Macintosh clients with access to Digital Equipment Corp. VAX Rdb databases, Vaz said. ODBC on AppWare would not only simplify development of database applications, but would also make them automatically portable between the lab's Macintosh and Windows clients, Vaz said.

For Boston Edison Co., AppWare promises an easy way to develop applications that integrate a combination of Sybase, Inc. and Oracle Corp. databases, as well as programming environments such as Microsoft's Visual Basic and OLE 2.0 and Powersoft Corp.'s PowerBuilder, said John Dubiel, manager of planning and technology at the utility. He said he hoped to start testing AppWare in June, particularly from a performance standpoint.

Existing ALM supporters of AppWare include: Borland International, Inc., Gupta Corp., Oracle, Reach Software Corp. and WordPerfect Corp.

SUM OF APPWARE'S PARTS

- **Visual AppBuilder** graphical development tools.
- **AppWare Loadable Modules** (ALM), which are reusable objects that provide applications with access to networked services.
- **AppWare Foundation**, which consists of APIs that offer automatic portability across many clients, including Macintosh, Windows and NT, UnixWare, SunOS and HP/UX, with plans for OS/2 and Vines.
- **AppWare Bus** manages ALM interactions.

Help on the way

The following third parties just committed to writing ALM versions of their products

PC-TO-HOST	Attachmate Corp. WallData, Inc.
MULTIMEDIA	Looking Glass Software, Inc.
DOCUMENT PROCESSING	ImPower, Inc. Imagery Software, Inc.
TELEPHONY	AT&T International Voice Exchange, Inc.
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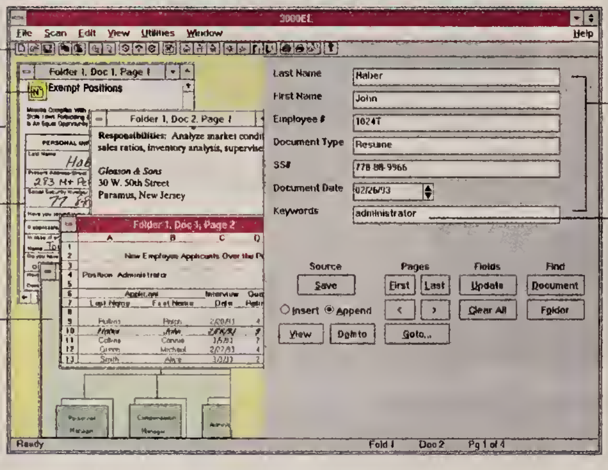

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First Name: John
Employee #: 1024T
Document Type: Resume
SS#: 778-88-9966
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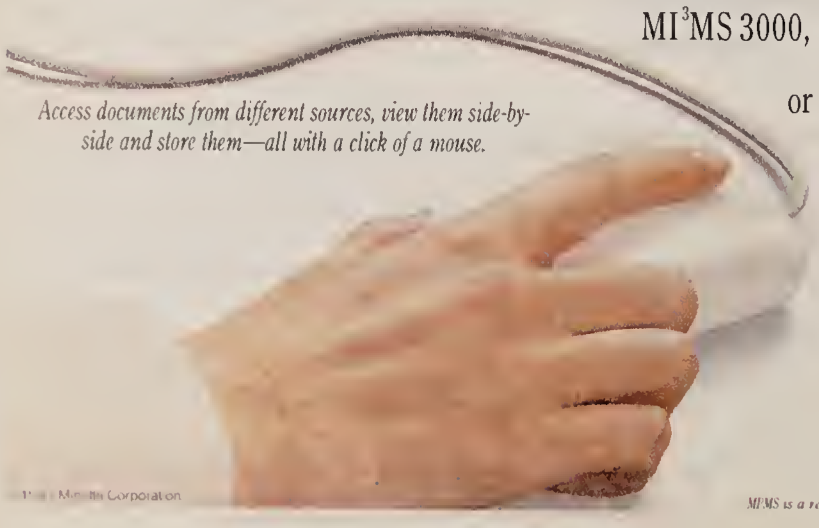

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“We were told it was impossible to develop a client/server application without extensive retraining. Then we talked to Micro Focus.”

Larry Lowder, Systems Architect, Questar Service Corporation.

Mountain Fuel Supply®, a division of Questar®, is a utility company supplying natural gas to 750,000 customers across Utah, Wyoming, Idaho and Colorado. The company's success is largely driven by its implicit belief that the customer is number one.

Yet, IT also plays its part in that success: client/server architectures and graphical user interfaces (GUIs) have helped Mountain Fuel Supply move applications and information closer to the customers and the employees. All of which has resulted in an augmented level of service being offered to customers.

When Larry Lowder, one of Questar's Systems Architects, set out to build the client/server architecture for Mountain Fuel Supply, he needed solutions, not skepticism. For the first project, a cashiering system, he needed to link workstations with OS/2® to the DB2® database on the host, running CICS™.

“We were faced with having to spend up to two years retraining our COBOL programmers in C and API calls. Then we discovered Micro Focus Dialog System™. It allowed us to build the client functionality we required, and re-engineer the existing mainframe application as a server.”

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Dell server line to grow

By Michael Fitzgerald
AUSTIN, TEXAS

Fifth-ranked PC server maker Dell Computer Corp. hopes to step out of Compaq Computer Corp.'s lengthening shadow by introducing two new lines of low and midrange Pentium servers in mid-February, according to sources who have been briefed on the company's plans.

Dell will announce new versions of its XE 4000, to be renamed the PowerEdge ST, and also a new line called the PowerEdge SP [CW, Jan. 17]. These will ship late in February, sources said. Improved reliability through error-correcting code and better diagnostics were cited by sources as important moves by Dell to help it battle Compaq's ProLiant servers.

Both lines include Intel Corp. Pentium and high-end I486 configurations, Peripheral Component Interconnect local bus and up to 2.2G bytes of storage.

Taking on Compaq

Analysts said Dell needed to upgrade its server line to fight Compaq.

"Dell does not have a server strategy. It has a PC on steroids," said Leslie Fiering, an analyst at Gartner Group, Inc. It makes sense for Dell to try to beef up its product line, she added.

One corporate user, who asked not to be named, said the new servers were good enough to stem his company's flight from Dell's server line to that of Compaq. "We were moving away from Dell until we heard about these and then decided to stay," the user said.

The products, though, are too late for Michael Stonecipher, office systems manager at United Missouri Bank in Kansas City, Mo. Stonecipher said he had moved his server purchases away from Dell to ProLiant.

Servers up!

A sampling of specs for Dell's upcoming servers

	RAM	HARD DRIVE	SLOTS AND BAYS	PRICE
POWER EDGE XE* •486 •60-MHz & 66-MHz PENTIUM PROCESSORS	8M bytes. Will support up to 192M bytes.	1G byte, 1.6G byte or 2.2G bytes (SCSI)	9 slots, 8 bays: •7 slots support EISA •1 slot supports PCI •1 slot supports PCI & EISA	$4,150 starting price
POWER EDGE SP* •486 •60-MHz & 66-MHz PENTIUM PROCESSORS	8M bytes. Will support up to 128M bytes.	Same as above. Smaller drive also available (SCSI and IDE).	7 slots: •5 slot support EISA •1 slot supports PCI •1 slot supports PCI & EISA	Starts at approximately $4,469

*INTEL CORP.'S PERIPHERAL COMPONENT INTERCONNECT (PCI) LOCAL BUS WITH 64-BIT DATA TRANSFER

The XEs will dump the old R2D2-esque design and adopt a more conventional tower-like configuration, the sources said.

"This announcement is extremely important for Dell and its customers," said John Dunkle, president of WorkGroup Technologies, Inc. in Hampton, N.H.

Dell officials declined to comment on specifics. However, Martin Seyer, Dell's director of advanced systems marketing, said in a recent interview, "You're going to see us come on really strong in servers this year."

Seyer said Dell intends to double its share of the PC server market. It is also aiming to sell 35% of its servers through value-added resellers and integrators, up from 15% last year.

Wireless computing

Compaq delays handheld

By Michael Fitzgerald

The market for wireless data services suffered a temporary setback last week when Compaq Computer Corp. said it would rethink its Mobile Companion handheld unit because of problems related to Apple Computer, Inc.'s Newton MessagePad. Newton's problems have delayed Mobile Companion's release until late 1994.

Gian Carlo Bisone, vice president of North American marketing at Compaq, said the ineffectiveness of Newton's handwriting-recognition technology, coupled with its lack of software, led Compaq to add a keyboard to its own product. "We don't want to use our customers as guinea pigs" for new technologies, Bisone said.

"The infrastructure is not in place for [a keyboardless] product. Users want to talk to their desktops and get their E-mail, and they need a keyboard for that," said a source close to the project. Similar products on the way from AT&T Global Information Services and Sony Corp. will use keyboards, the source added.

Mobile Companion is meant to give users remote access to their files via wireless communications. Information systems managers contacted seemed uncertain how to integrate this type of product into their environments — yet another hurdle for Compaq and other handheld makers to clear.

"I look at the files I have and . . . a very small percentage are in the computer right now," said Chad Pearce, vice president of IS at Godwins Booke & Dickenson, a benefits consultancy in Philadelphia.

Portable news

Meanwhile, Compaq is staying active on other portable fronts. It will start a first-quarter onslaught by releasing its Contura subnotebook Feb. 7, according to sources close to the company.

The base configuration 3½-pound subnotebook will use an SL-enhanced 25-MHz 486SX processor, an 85M-byte hard drive, a PCMCIA slot and 4M bytes of RAM. It will cost $1,399. An external floppy drive that plugs into the PCMCIA slot will cost another $149, sources said.

Compaq will also deliver new LTE Lites and new full-size Conturas in the first quarter, sources said. The high-end LTE Lite, designed to refresh a product line analysts called long in the tooth, will include a 540M-byte hard drive, local-bus video, an enhanced trackball and an unannounced 25/75-MHz Intel DX4 clock-tripler, sources said. This product is expected to appear late in March, sources said.

Intel

CONTINUED FROM COVER 1

which are also involved in the Personal Conferencing WorkGroup. The workgroup is working on a videoconferencing specification.

ProShare is a communications package that lets remote users simultaneously edit and annotate a document through Microsoft Corp.'s Object Linking and Embedding. It also gives users the ability to broadcast a video image of themselves when the software is combined with the monitor-top video camera and video and communications add-in boards that come with the Video System 200.

But the current version will not likely be widely adopted. The video images run at 15 frames per second — half the speed of a TV show — makings for the equivalent of a slow-motion TV replay with jagged edges, splotchy color and disjointed video and audio.

Even Intel acknowledges desktop videoconferencing is an application of the future. Its focus is on the $99 ProShare, which lets remote users view and annotate the same document simultaneously. A feature called JumpStart sends a runtime version of ProShare to systems that do not have it.

First of many steps

Analysts praised Intel's efforts.

"This is a very important first step to real videoconferencing, and by building in the file sharing capability, they have picked a good way" to build toward videoconferencing, said Tim Bajarin, president of Creative Strategies Research International, Inc. in San Jose, Calif.

But Intel still has much work to do. Bajarin said ProShare works only on a one-to-one basis. Also, it does not share files, though ProShare Premier, a $299 package due in the first half, will do so.

Stephen Casey, U.S. Bancorp.'s manager of office technologies and a ProShare beta tester, said he thinks the Premier version will be useful to his company, which has numerous remote sites.

Several users contacted said videoconferencing was something their business could use.

"We see a pent-up demand for desktop videoconferencing," said Justin Alexander, manager of advanced technology at SmithKline Beecham, Inc. in Philadelphia.

Alexander, a beta tester of ProShare Video Server, said he likes its low cost. Even with a $2,499 list price, it is one-third the cost of the next least expensive videoconferencing package on the market. Intel and the telephone companies have put together deals that price the units as low as $1,199.

At the same time, Alexander said, videoconferencing technology must be usable over a LAN (Intel's will not be until later this year, and Novell, Inc.'s NetWare is an Intel target) and must overcome the question mark of ISDN.

The ISDN issue is a loaded one. ISDN has been widely adopted in Europe and Japan, but its high cost has been disdained in the U.S. and has discouraged multinational firms from adopting it. This may slow the U.S. government's efforts to build an information superhighway.

"Right now, I feel like roadkill on the information highway," Alexander said. He said it took 20 minutes per system to install the Intel boards and software but two days for his telephone company to set up the ISDN switches he needed.

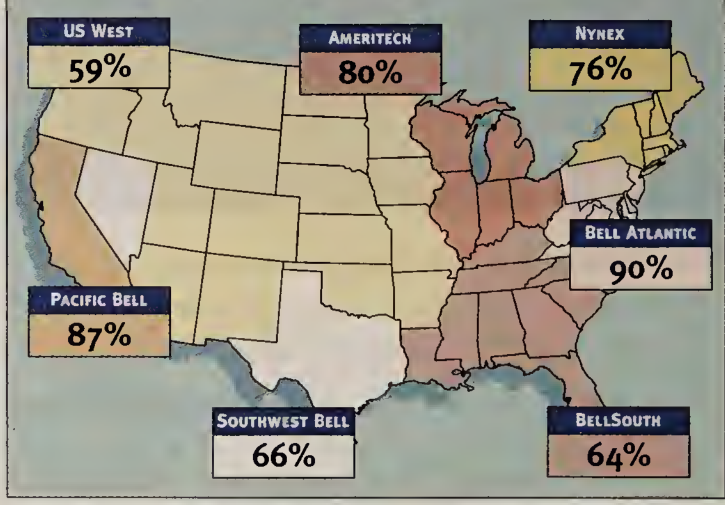
"Two days is lucky," said Elliot M. Gold, president of TeleSpan, a telecommunications consultancy in Altadena, Calif.

"Intel solved the ISDN problem by getting a majority of the common carriers to" back it, Gold said.

Coast to coast

U.S. phone companies plan to greatly increase ISDN lines by 1995, giving a potential boost to real-time video conferencing

PERCENT OF PHONE LINES IN EACH REGION THAT WILL BE ISDN-CAPABLE BY 1995



Source: Bellcore, Livingston, N.J.

CW chart: Dave Marshall

Big bucks

Intel said it will spend $100 million annually on videoconferencing. In contrast, it will spend $2.4 billion this year alone on capital infrastructure.

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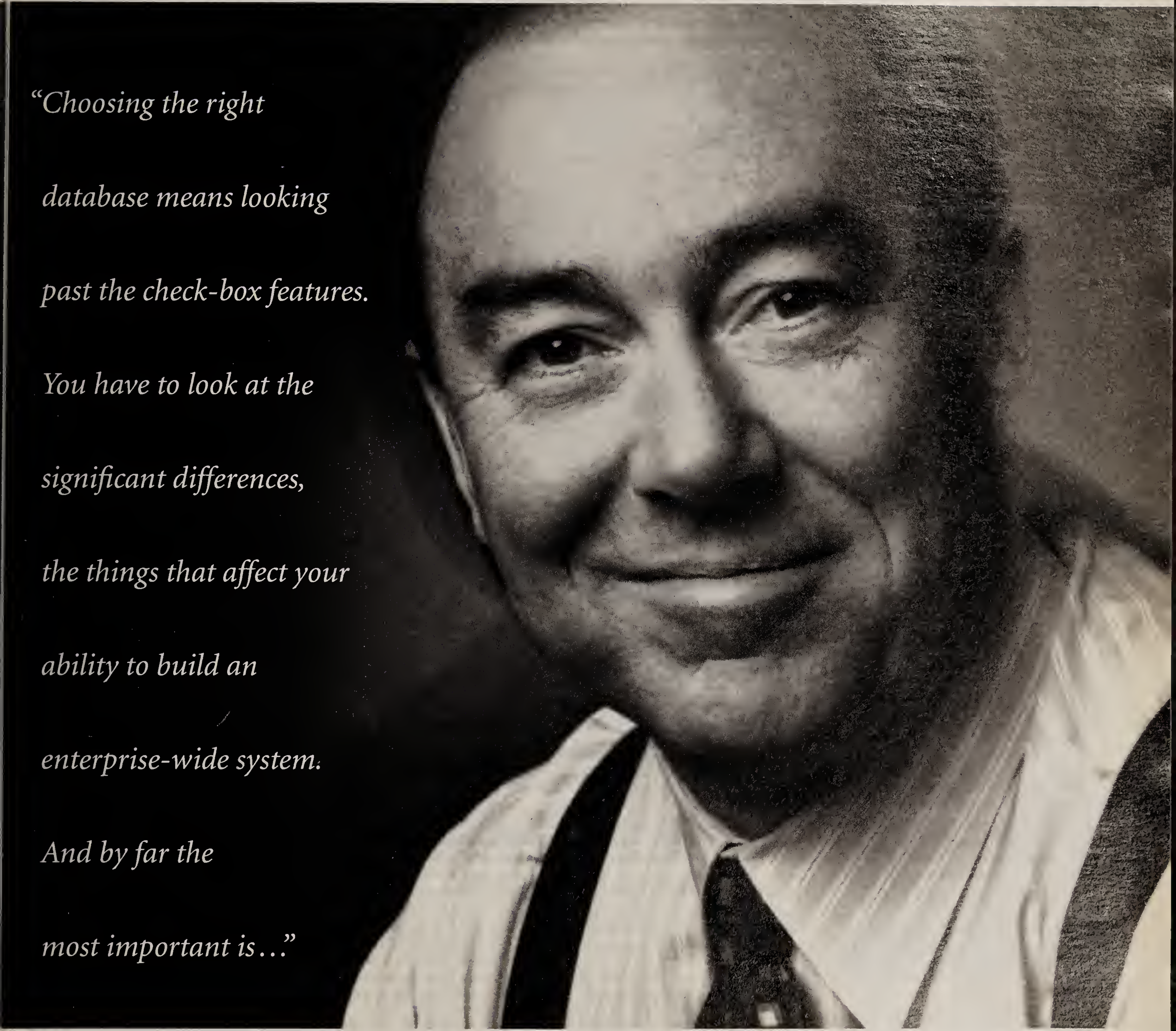

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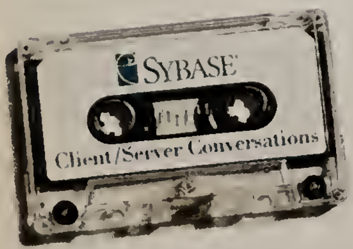

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Broadband all the rage at ComNet

By Ellis Booker

Even as wags pointed to the dearth of real-world users needing wide-area broadband networks, carriers at this year's ComNet were busily unveiling an assortment of broadband services.

MCI Communications Corp. and Bell Atlantic Corp. announced what they called the first customer implementations of a Switched Multimegabit Data Service (SMDS) for network traffic traveling within a regulated phone region. SMDS is a switched, fast-packet technology — supporting access connections from 56K to 45M bit/sec. — that has been adopted by regional phone companies for metropolitan areas.

The trial links Bell Atlantic SMDS networks in several cities with MCI's HyperStream SMDS services offering. The initial service trial of HyperStream will involve Meridian Bancorp, Richmond-based Signet Banking Corp. and Quebecor Printing in Boston.

The Meridian test will connect 6,000 terminals and more than 1,000 LAN-connected PCs, which can now retrieve data from 300 branch offices and 265 automated teller machines.

Meanwhile, BellSouth Corp. unveiled what it called the world's first Sonet/ATM Information Superhighway, a network linking 106 state government sites in North Carolina. The state will connect 52 secondary schools, 16 universities, 18 community colleges, 11 medical facilities, four state government sites, three public safety sites and two scientific sites.

BellSouth had previously committed $69 million to its network upgrade in the state.

The high-speed network will involve five Asynchronous Transfer Mode (ATM) switches from BellSouth and two each from Carolina Telephone & Telegraph and GTE Corp.

More ATM, too

Separately, GTE Telephone Operations in Irving, Texas, last week announced plans to put more than 60 ATM switches in its 13-state region. GTE is testing switches from AT&T Network Systems, Northern Telecom, Inc. and NEC America; it has already deployed two ATM switches from Fujitsu Ltd. for the North Carolina information highway project.

MCI also announced a new service called MCI DataStream, which will support Integrated Services Digital Network (ISDN) interfaces into Vnet, MCI's virtual private network service for large companies, and MCI Vision, its virtual private network service for smaller companies.

MCI said DataStream will support both switched Basic Rate Interface and the dedicated Primary Rate Interface ISDN, thus offering customers access speeds ranging from 56K bit/sec. to T1 (1.54M bit/sec.)

Reporter's Notebook

More fiction than fact: While ATM generated much buzz at last week's ComNet, practical implementations of the technology beyond niche markets still appear to be several years away.

"In terms of ATM products and services, right now we're on the cusp of opening the watershed, but we're not quite there yet. Users are still testing the waters to see if ATM is for real," said E. W. Bud Huber, general manager at Hughes Electronics and an ATM Forum member.

Virtual escape: Also, user presence at an ATM session was thin. Maybe they were all over at **Telenex Corp.**'s booth, which offered attendees a chance to escape from the chaos on the show floor via a virtual reality game. The booth became a spectator attraction, as passersby stopped to gawk at players in Darth Vader-esque helmets, gyrating as they navigated through a futuristic three-dimensional city.

Traffic control: Wellfleet Communications in Billerica, Mass., added traffic management features including protocol prioritization, congestion control and support for multiline circuits to the frame-relay interface for its multiprotocol routers/bridges. The company also added protocol support for Vines, AppleTalk and Source Route Bridge.

Partnerships galore: IBM and **Proteon** held a briefing to elaborate on their plans to jointly develop a line of routers for remote sites. IBM will provide its Data Link Switching, APPN and network management technology, while Proteon will lend its protocol routing expertise. Requests for hardware and pricing specifics were met with repeated promises that users could expect to see the first fruits of the partnership at Interop '94 Spring.

Net management

CONTINUED FROM COVER 1

nology still does not meet their long-term, strategic network management needs. Many cited roadblocks such as complexity, high costs and less-than-ideal harmony between platforms and applications.

Attendees and speakers at a day-long seminar loudly expressed the need for affordable systems and network management tools to help them respond to rapid reorganizations by redeploying resources.

Devious agents

Attendees at a ComNet seminar said that sometimes network management agents lie, such as reporting that a device is healthy when in fact it is not. Interworking Labs, a testing service in Mountain View, Calif., is offering a way for users to ensure SNMP agents operate properly: Dial Internet at: host — ftp.ics.uci.edu; directory — mrose/isode-snmpV2; file —isode-snmpV2.tar.Z

Still missing is interoperability among management platforms. For instance, most Unix-based platforms have a limited ability to work with PC LANs and legacy systems. While Unix-based platforms are popular, third-party applications sometimes conflict with one another, users said.

Also, the consolidation from roughly 40 platform vendors in 1990 to roughly a half-dozen main players today has some users worried that their platform of choice may not be around for long (see chart cover 1).

"Our goal is to have one network system to manage everything from LANs to the Internet, but we can't develop a time frame yet because there is no way of knowing when the products will be there," said Thomas Partelow Jr., a supervisor of electronics engineers at an Air Force computing operations agency in Scott Air Force Base, Ill.

However, product deliveries should help some firms address this problem soon. For instance, IBM demonstrated software that sends PC-level information from its OS/2-based, Token Ring network management platform (LAN NetView Manager) to a Unix-based NetView/6000.

Slated for delivery in March, according to an IBM systems engineer, LAN NetView Manager/6000 now collects management information from Fiber Distributed Data Interface networks and is slated to manage Ethernet, Asynchronous Transfer Mode and wireless networks by the end of 1994, the engineer added.

For integrating host and Unix management, IBM demonstrated its SNA NetView/6000 software, slated for April delivery. It sends SNA alerts to the NetView/6000 platforms.

Designed to simplify

IBM also made several announcements aimed at easing the job of extracting and manipulating management information from its host NetView product — which is completely separate from its Unix-based NetView/6000 (see story at right.

Bryant Strickland, a principal network consultant for Network Solutions, an outsourcer in Atlanta, said he wanted physical changes in the network to automatically register in a network management application. To that end, Isicad, Inc. in Anaheim, Calif., demonstrated an upgrade to its Command physical asset and cable management application that ships this week. Command runs in stand-alone mode or on SunConnect's SunNet Manager or Hewlett-Packard Co.'s OpenView.

For Jeff Bergin, a telecommunications engineer at Ontario Hydro, an electrical utility in Toronto, the challenge is to combine network and telecommunications management by the end of the year. He had to scale back his original goal of unified configuration management to simple LAN/wide-area network and telecommunications alarm consolidation because existing products are not robust or affordable enough to meet the company's "under $5 million" budget for the project, Bergin said.

"Ideally, I would like to use something like HP OpenView to do everything. Now their weak point is telecommunications management," he said. For example, OpenView cannot manage his 100 microwave sites, he added.

While HP does not provide any applications for microwave telecommunications management, the company said that in May it will ship improvements to its OpenView Distributed Management Platform, which adds Open Systems Interconnect telecommunications support to the basic Simple Network Management Protocol OpenView platform.

In support of the announcement, Siemens Public Communication Networks Group, which is based in Berlin and Munich, Germany, said it intends to use the HP platform to develop management applications to bundle with its large telephone switching systems.

The latest network news

Other IBM and HP network management announcements at ComNet included the following:

- **IBM NetView Network Planner/2:** an OS/2 application that lets users download and manipulate system and network information from host NetView's Resource Object Data Model. Available now for $3,995.
- **IBM LAN Management Utilities/6000:** lets users manage Novell NetWare and LAN Server systems from a NetView/6000 Unix station. Available March 25 for $6,950.
- **IBM NetView MultiSystem Manager:** Updates to the system allow improved LAN management from host NetView. Available April 29 starting at $9,600.
- **NetView Access Services:** a session manager for VTAM applications for host NetView. Available in July starting at $20,540.
- Separately, HP announced 21 channel partners trained to sell and install the OpenView line.

—*Lynda Radosevich*

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News Shorts

Microsoft database guru steps down

Microsoft Corp. last week announced on CompuServe that database guru Dave Fulton will no longer be the company's chief architect for databases. A company spokeswoman said Fulton is taking a leave of absence to research the so-called "digital convergence" and the information superhighway.

Compaq to use AMD processors

Compaq Computer Corp. last week announced that it would use processors from **Advanced Micro Devices, Inc.** (AMD) in some products, saying that offers some different chip capabilities from Intel. AMD has pursued Compaq for years to buy its chips. Compaq's first AMD-based systems are expected out in the first half of the year.

Sculley staying put, he says

Spectrum Information Technologies, Inc. Chairman John Sculley once again denied rumors that he is planning to leave the Manhasset, N.Y., vendor of cellular data communications equipment. Spectrum, meanwhile, confirmed that it is being investigated by the Securities and Exchange Commission regarding the value of its license agreement with AT&T. Statements regarding that value were the subject of a class action lawsuit that has been settled in principal.

CSC wins Ford Europe contract

Computer Sciences Corp. last week said it won a five-year outsourcing deal with **Ford Motor Co.**'s European parts and services operations, based in Cologne, Germany. The deal is valued at an estimated $100 million. The contract calls for Computer Sciences to manage one data center in the UK and another in Germany and to provide application development for sales analysis, accounting and distribution.

Antitrust branch OKs insurance DBMS

The **U.S. Department of Justice's Antitrust Division** last week said it will not challenge the insurance industry's plan to create a database of the prices charged by 1,400 automobile and home insurance companies. Ordinarily, the agency would be concerned about industry use of the database for price fixing, but the insurance industry has a unique exemption from federal antitrust laws under the McCarran-Ferguson Act of 1945.

Gupta on a Quest

Gupta Corp. last week said it has split its Quest database query tool into two separate products: Quest Reporter for managing simple, end-user queries, and Quest 2.1 for handling more sophisticated tasks required by information systems staffers. Quest Reporter, priced at $249, runs on PCs and workstations and performs predefined functions via point-and-click techniques. Quest 2.1, priced at $495 — down $100 from previous versions — builds forms, generates reports and produces business graphics.

SHORT TAKES **Wang Laboratories, Inc.** last week reported operating income of $14.6 million for its second fiscal quarter on revenue of $231.8 million, down 34% from a year ago. It was the second straight quarterly profit for Wang. Net income totaled $4.9 million after taxes and noncash accounting charges related to its Chapter 11 restructuring.... **Sapiens International Corp.** last week announced that Frederick Tremblay, a former IBM executive, will succeed David Bursick as president of **Sapiens USA, Inc.**'s North American operations.... **Novell, Inc.** has agreed to spin off its Btrieve database product line into a separate company, **Btrieve Technologies.**

Workplace OS faces delay

CONTINUED FROM COVER 1

driver model," said Paul Giangarra, the chief architect of Workplace OS. "We are trying to figure out a way to get to the future quicker so we do not have to make any midcourse changes later on."

Before IBM can reach its goal, it faces a substantial amount of work to incorporate the device driver model into Workplace OS, developers familiar with IBM's plans said. They do not expect to see the finished version, which will run on IBM's PowerPC-based desktop systems, until Comdex/Fall '94.

Farsightedness

Some OS/2 developers, who expected to receive betas early this year, said they were disappointed. They were hoping to move their Intel-based, OS/2-compatible applications to the PowerPC platform sooner, rather than later, to get a jump on Windows developers by offering a more compelling cross-platform strategy than their rivals.

However, most OS/2 developers said IBM's decision will serve them better strategically over the long haul.

"It makes perfect sense to do this. It is a wise decision and worth the delay to do it," said one OS/2 developer. "What is interesting is we may have an operating system that takes immediate advantage of the hardware instead of having to wait the usual two or three years."

To soften fears about the lack of optimized applications available for Workplace OS/2 on the PowerPC, IBM is working on an advanced compiler technology that converts OS/2 applications on Intel platforms to applications that take full advantage of Workplace OS/2 on the PowerPC. This technology will be available by midyear — approximately the same time as the first Workplace OS/2 betas.

"We do not need to have Workplace OS/2 running on PowerPCs for six months to a year before someone can build an application to the 32-bit OS/2 APIs," Giangarra said. "We will create the ability to very quickly recompile existing 32-bit Intel [OS/2-compatible] applications to work natively with Workplace OS/2 on the PowerPC."

Share and share alike

Workplace OS and Taligent share not only common device driver models, but also common microkernels, which is indicative of what is expected to be an increasing synergy between the two operating systems over the next year.

With the help of a small Dallas-based consultancy called One Up Corp., IBM is also working on a technology referred to by one source as "the sausage grinder." It reportedly will convert 16-bit Windows code to 32-bit Presentation Manager-compatible programs. That code can then be run through the compiler that IBM is now developing, allowing a Windows application to work on PowerPCs running Workplace OS/2.

IBM is expected to announce the latter technology in February, according to a source close to IBM. IBM refused to comment on the technology it is working on with One Up.

Just in time?

The delivery of the Workplace OS/2 beta in late second quarter should coincide with the scheduled delivery of the PowerPC-based desktop systems from IBM's Power Personal Systems division.

"Our goal is to have the development betas in people's hands about the same time the PowerPCs from IBM ship so they can create these native applications," Giangarra said.

But if there is too great a span between deliveries of the PowerPCs for the desktop and Workplace OS/2 betas, then IBM has only AIX to offer PowerPC users. Some observers last week said they thought AIX would not appeal to the broad base of desktop users.

Off the pace

With Apple Computer, Inc. expected to deliver its first PowerPC-based system in March, along with a version of its operating system that takes advantage of the PowerPC chip, IBM could be at a competitive disadvantage.

"Apple has the potential to sell a load of them. IBM has no software that anyone would be interested in. AIX on the PowerPC is hardly a competitive offering," said Will Zachmann, president of Canopus Research, Inc. in Duxbury, Mass.

Some users agreed.

"It would probably [slow acceptance of IBM's PowerPC] because we would not want to use AIX," said Jonathan Borden, computer systems manager in the chemistry department at the University of Texas at Austin.

OS/2 and Windows/NT face-off starts on page 128.

AMRnet snares first contract to mark anniversary of launch

By Ellis Booker

Almost a year to the day after AMR Corp. said it would resell capacity on its AMRnet data network to nonairline customers, subsidiary AMRnet Network Services scored its first major contract. The unit last week disclosed a three-year deal worth up to $250,000 with National Farmers Union Insurance Cos. in Denver.

National Farmers will switch its remote claims offices from a private T1 network, now provided by Sprint Corp., to a switched dial-up network using AMRnet.

"We'll be saving as much as 40%," said Ron Kienzle, vice president of MIS at National Farmers.

AMRnet Network Services in Fort Worth, Texas, is a unit of AMR Information Services, a subsidiary of American Airlines owner AMR Corp. Launched last year at ComNet, the company offers packet data services on AMRnet, including dial-up asynchronous data at speeds ranging from 9.6K to 14.4K bit/sec., as well as dedicated connections up to T1 speeds. The network supports both X.25 and IBM's SNA protocols.

Small-town appeal

John Stehman, vice president of AMRnet Network Services, said the company was targeting users outside the Fortune 500 market. He noted that AMRnet has dial-up access in some 1,000 cities and towns.

The availability of AMRnet in smaller municipalities was clearly a plus for its first customer, National Farmers. "As our name suggests, we try to serve rural America," Kienzle said, noting that the Sprint T1 network connected only about 25 remote locations back to the company's IBM AS/400 in Denver.

"Now we're wide open," he said, adding that by the end of three years he expects to reach 100 remote offices.

ARMnet Network Services hopes to have approximately 20 customers within a year, according to company officials.

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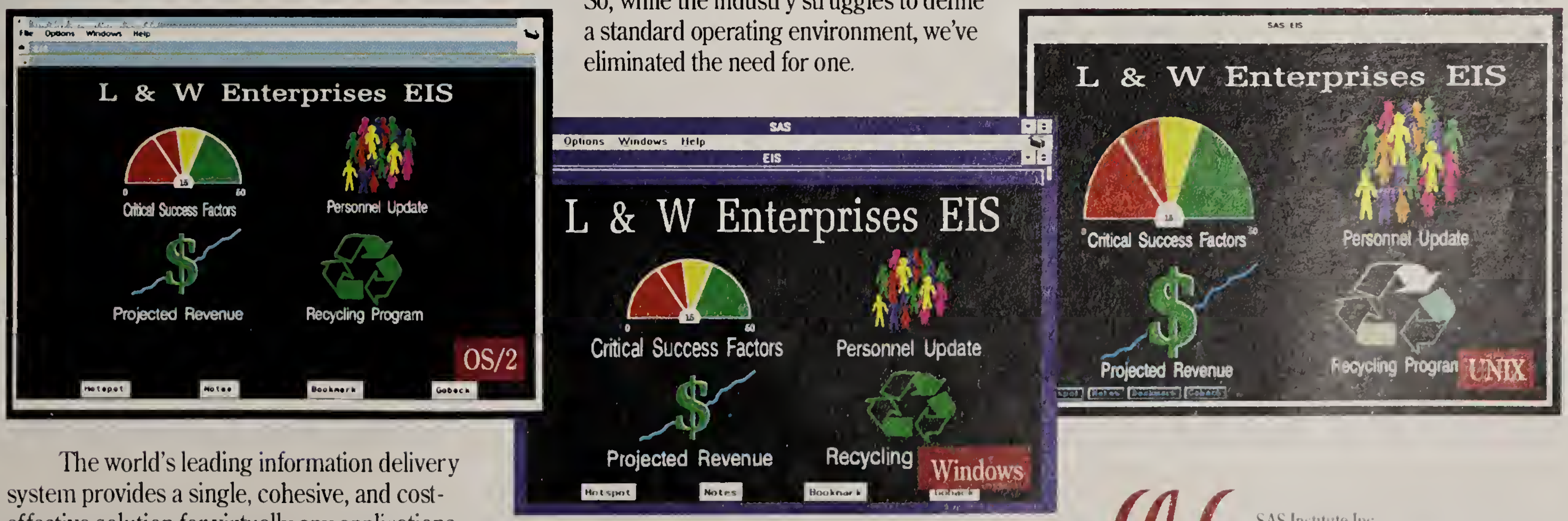

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Apple eases doubts, will build on Bedrock

By James Daly

Apple Computer, Inc. ended months of speculation about its commitment to the Bedrock cross-platform development environment last week when it announced that it will use the technology as a foundation for its OpenDoc compound document architecture.

Bedrock, a joint project of Apple and Symantec Corp., was designed to allow programmers to write a single version of an application and then recompile it for Macintosh or Windows without recoding.

The air of uncertainty emerged following the June announcement of OpenDoc, an Apple-designed technology for creating a single document containing multiple types of data, such as text, graphics, sound and video. OpenDoc was announced as a competitor to Microsoft's Object Linking and Embedding architecture and is scheduled to be available this summer. OpenDoc-compliant applications will also run on the Macintosh or the Windows platform.

While it is clear that Bedrock and OpenDoc will coexist, neither company would provide details on their intermingling. But in the 18 months since it was announced, Bedrock's scope has expanded to include the compound document architecture focus of OpenDoc.

Bedrock will include a low-level, high-performance set of class libraries for C++ programmers developing cross-platform applications. The OpenDoc parts framework will be derived from the Bedrock technology, said Ike Nassi, vice president of the development products group within AppleSoft, Apple's software division.

Bedrock is in beta testing, and Symantec is scheduled to ship low-level foundation classes in the first half of this year, a Symantec spokeswoman said.

The first commercial Bedrock release, however, may not include the components to build OpenDoc parts. "It's a possibility that OpenDoc may be added later on," Nassi said.

Solid foundation

Bedrock provides a common set of building blocks, or "objects," that become the basic structure for an application. Such a framework enables developers to create a single version of source code that can then be tailored to platform-specific versions of an application, according to Symantec Vice President Gene Wang.

Apple developers said cross-platform development platforms are critical, especially considering the financial lure of Windows. But most said they have not seen much progress on Bedrock.

End users said they are excited about experiencing OpenDoc's ability to custom create in-house applications. "I'm getting tired of getting these kitchen sink applications with everything thrown in," said Robert Anderson, a senior analyst at A.O. Smith Automotive Products Co. in Milwaukee.

Mac-DAL

In what seems like a dry run for the licensing of its operating system, Apple last week announced that it has licensed its Data Access Language (DAL) to Independence Technologies, Inc.

DAL is a data connectivity language intended to ease the frustration of retrieving data from multiple platforms. With DAL, applications can swap information among multiple platforms.

The complexity of keeping up to date on the platforms DAL supports has proved to be tough for Apple. Analysts said Fremont, Calif., Information Technologies is a wise choice because of its history as a provider of middleware that enables customers to build distributed transaction-processing and decision-support applications. Apple will take an undisclosed minority equity position in Information Technologies. —*James Daly*

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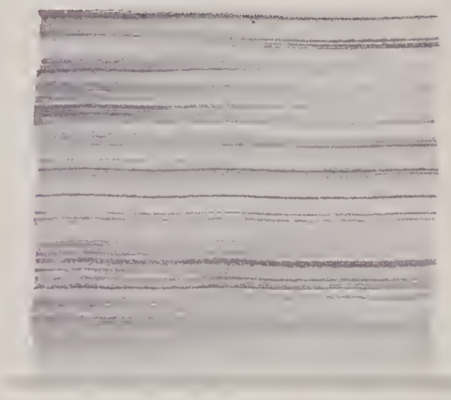

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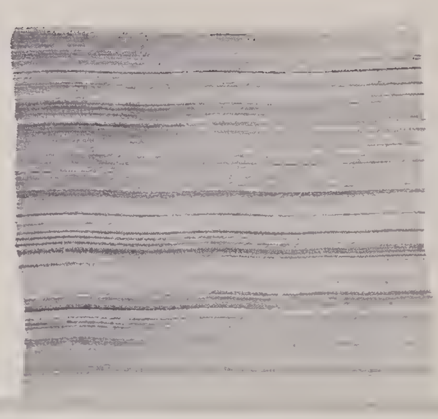

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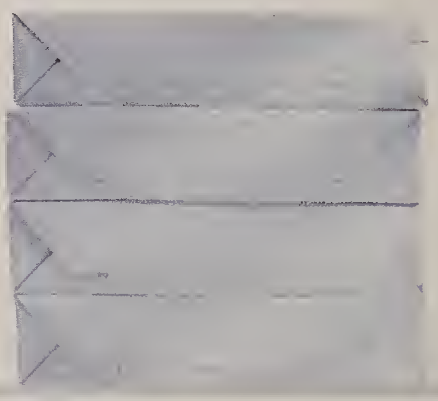

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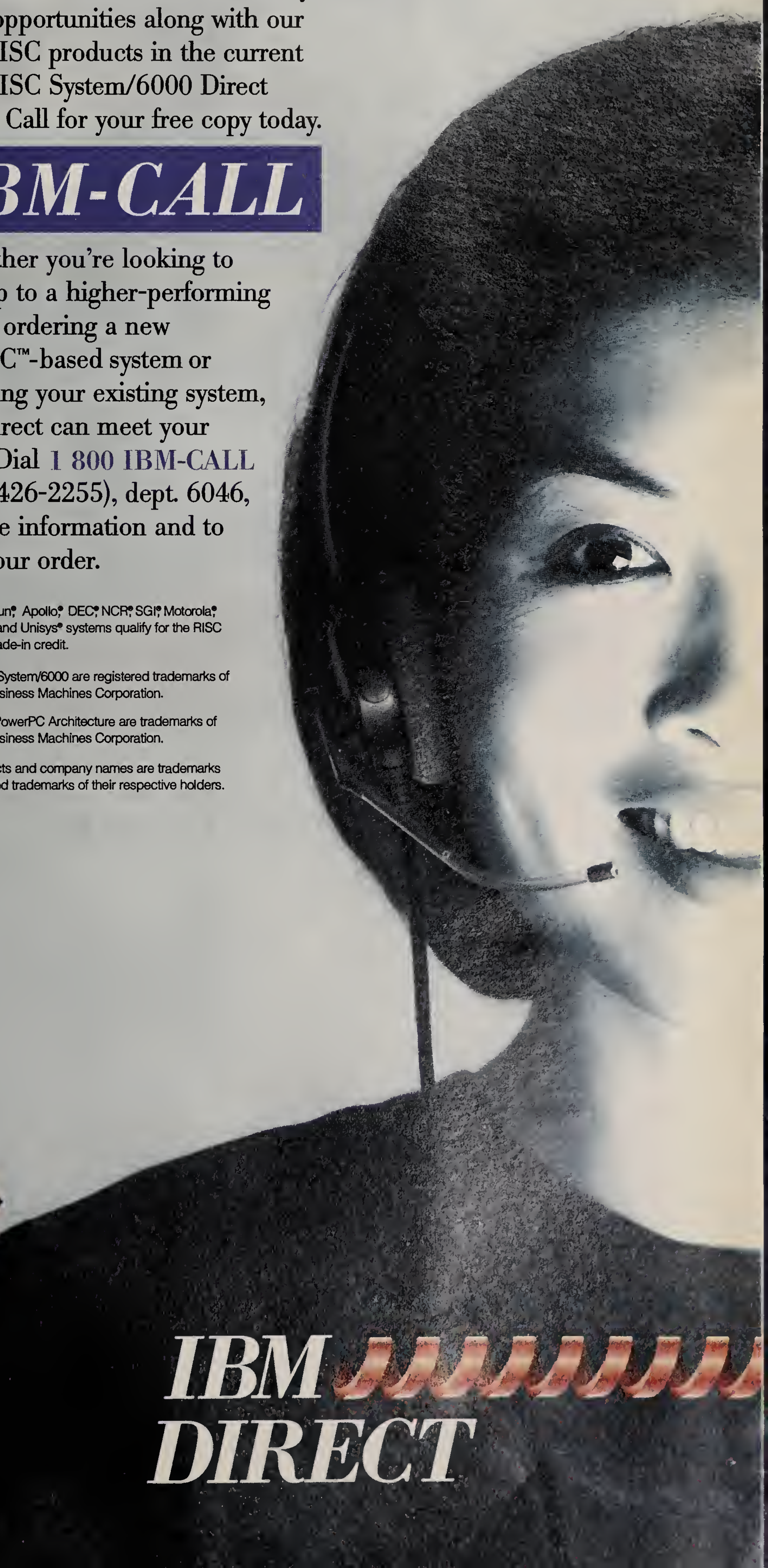

LAN managers to get NetWare scripting tool

By Elisabeth Horwitt

LAN administrators gave two thumbs-up to last week's announcement of a scripting language that promises to automate much of the grunt work involved in managing Novell, Inc. NetWare servers.

RexxWare is SimWare, Inc.'s NetWare Loadable Module (NLM) version of IBM's Rexx procedural scripting language, which is used to develop automated network management routines for IBM's NetView. RexxWare is said to allow administrators to write tailored routines to accomplish NetWare server administration tasks such as adding or changing user profiles, measuring server usage for accounting purposes and loading and unloading NLMs on the server.

There is a ready market for such a tool, according to a recent survey of approximately 50 NetWare administrators by WorkGroup Technologies, Inc., a consulting firm in Hampton, N.H. Some 36% of survey respondents had used Rexx. Of those, 78% said they would use a product such as RexxWare to automate key routines for their job, said John Donovan, senior consultant.

Ottawa-based SimWare enhanced IBM's Rexx with NetWare-specific features such as the ability to go into Novell binderies and Btrieve databases for information about server use and user accounts, said Keith Fukuhara, lead consultant at Wang Laboratories, Inc.'s Office and Integration Services in San Francisco.

"We've been waiting for years for mainframe utilities to come down to PCs," said Fukuhara, who is also president of the San Francisco branch of the Certified NetWare Engineers Professional Association.

An administrator can write RexxWare scripts to get very specific information such as the amount of disk usage and how much time is spent on reads and writes on the server, said Fukuhara, who has been running a beta version of the product.

For example, one script could collect information on different users' total log-on time and number of data transfers on a server; then a second script, tied to the first, could initiate a data transfer to an accounting package on the IBM mainframe, via Novell's NetWare for SAA gateway.

Timing is all right

It takes an average of 12.5 minutes to add a user account to a NetWare server in a multiserver environment; it takes 81 minutes to install a network version application software package; and 9.5 minutes to change a user account, according to the Business Research Group.

"That's useful if you're trying to do reporting and budgeting" of computing resources in an increasingly client/server-based environment, Fukuhara said.

RexxWare includes more than 180 NetWare-specific functions as well as standard Rexx functions, flow control and recovery features, according to SimWare. The product also includes a Windows-based scheduler that lets administrators submit jobs such as network backups and server use reports to run unattended at specific times. Also included in the package are more than 30 sample scripts that can be customized to perform common administration tasks.

The product is scheduled for shipment on Feb. 14. It is compatible with NetWare Versions 3.11, 3.12 and 4.01 and is priced at $695.

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Cincom to customers: No more tiers

Pricing plan could save up to 70% of the tiered price

By Johanna Ambrosio

■ Cincom Systems, Inc. next week will formally disclose a usage-based pricing structure for its Supra relational database management system even though the company is still searching for an automated mechanism to measure software use.

Under this information utility concept, Supra shops will have the option of paying for how much data users request and use. Usage-based pricing will be Cincom's primary licensing approach and will be rolled out to other Cincom products over time, according to Alyssa Dver, manager of business and product management.

The company is adopting this approach in response to customer complaints regarding the tiered pricing model that is used virtually industrywide, a Cincom spokesman said. The company claims that the utility approach — which means the more you use, the more you pay — will save customers up to 70% of the tiered price. There are some 2,100 Supra licenses worldwide.

IBM on Cincom's heels

Other vendors, including IBM, have talked about adopting the utility approach with certain products, but Cincom is the first to implement it. IBM is working with customers to further define the utility concept it announced in May 1993 but has yet to deliver.

With Cincom's approach users pay a platform price based on the kind of computer that Supra will run on. This is analogous to getting a phone line installed, the company said, and ranges in price from $1,800 for a small Unix machine to $100,000 for IBM mainframes.

The other parts of the basic fee are the so-called usage keys, which are akin to the per-minute charges of a phone bill, Dver said. One key is equivalent to one request of the Supra database. If Supra, in turn, needs to tap data from other platforms to fulfill the request, it is still considered one key.

On the other hand, if two applications on a user's workstation request data from Supra at the same time, it is considered two keys. For that reason, Dver said, a key is not the same as an end user because one user could require more than one key. In reality, Dver said, it is often simpler for a shop to purchase the same number of keys as it has end users.

Starter kit

While busily putting the final touches on its pricing structure, Cincom last week announced a kind of client/server "starter kit." It includes one client workstation, one server, communications software, the Supra database server and assistance in moving VSAM and other kinds of files off the mainframe. The fixed price ranges from $40,000 to $65,000.

The price is $400 per key, for the first 10 keys. Thereafter, it is between $500 and $800 per key, depending on the number of keys purchased.

In addition to the base price, shops can select options such as enhanced security and multimedia support as well as four different support possibilities ranging from telephone-only to on-site. The options are priced as a percentage of the base price.

Cincom is still searching for a mechanism that automatically tracks the number of keys being used simultaneously to ensure that the number does not exceed what the customer purchased. When the automated tracker is in place, the software will not allow any more than the maximum number of keys to be in use at the same time. All other comers will have to wait for a key to open up.

At the moment, Dver said, "We're still doing it manually. We're on the honor system."

Cincom's utility pricing structure is in about a half-dozen accounts, and the reaction so far is positive. The Sonoma County Water Agency in Santa Rosa, Calif., has been using Supra Server on an IBM RS/6000 for a couple of years.

"We've always been paying per-user, so this doesn't really affect us too much," said Samuel Smith Jr., senior engineering programmer/ analyst. "It's really a fair way of doing it. Now we pay for what we use."

He said under a tiered pricing structure, "We would pay too much." Because Smith's shop is heavily engineering-oriented, it has a fairly large processor but the actual database use is fairly light.

Steve Thomas, MIS supervisor at Columbia Falls Aluminum Co. in Columbia Falls, Mont., said he "chose Supra because of the pricing" for a downsizing effort under way. "We looked at all the relational [database management systems], and this was by far a substantial savings. The others had per-user pricing, but with a fairly hefty minimum to get in."

For example, Thomas said, Cincom's platform price was $1,800 in his case, but another vendor's basic fee was $20,000. "This makes it really easy to get in," he said.

Pay as you go

Cincom's new "information utility" concept is similar to paying for phone service: It's usage-based.

1. Pay an "initiation" fee based on the platform size: Price: $1,800 (Unix) to $100,000 (MVS).

2. Find out what types of applications exist and the number of users likely to request information from a Supra Server at the same time.

3. Determine number of usage keys, based on applications and number of users. The price is $400 per key, for the first 10 keys. Then the price jumps to $500 to $800 per key.

4. Decide on options. The server is a percentage of the base price, and the options include enhanced security and multimedia support.

5. Choose support options, including telephone-only and on-site.

Critics anticipate privacy abuses on superhighway

By Mitch Betts
WASHINGTON

Businesses last week told the Clinton administration they want to provide commercial services such as home banking, movies-on-demand and electronic catalog shopping on the "information superhighway," but critics said they fear privacy abuses and overcommercialization.

At a federal hearing on the privacy issues of the National Information Infrastructure (NII), consumer advocates called for legislation to protect the privacy of transactional data on consumer buying habits. They also asked for some highway lanes free of commercial clutter.

Sales pitches on the NII seem inevitable, but some portion of the NII should be "free of commercial messages and the exploitation of personal data and electronic-mail addresses," said Robert Ellis Smith, publisher of the "Privacy Journal" newsletter in Providence, R.I.

Interactive service providers will be able to build very detailed profiles of consumers and may succumb to the temptation to sell that data to other marketers, testified Mary J. Culnan, an associate professor at Georgetown University and an expert on consumer privacy.

Even "window-shopping in the electronic mall" will not be anonymous, she added, because companies will track people who browsed but did not buy.

Culnan and Edmund Mierzwinski, consumer program director of the U.S. Public Interest Group in Washington, said new privacy legislation should codify the now voluntary code of fair information practices, which states that personal information collected for one purpose should not be sold or used for another purpose without the individual's consent.

Service providers should allow consumers — with the click of a remote-control button — to block the sale of their personal data to other marketers, Culnan said. If there are horror stories about misuses of personal data, "people may decide it's better to be an information pedestrian" and spurn the new services, she said.

At the hearing, a spokesman for New York-based Time Warner, Inc. said his firm's interactive-television system, which begins April 1 in Orlando, Fla., will allow consumers to "opt out" of third-party marketing campaigns. But he said Time Warner will give service providers and advertisers aggregate numbers on consumer activity to monitor what services are viable and which are not.

Art Sackler, Time Warner's vice president for law and public policy, also defended commercial use of the NII as providing consumers with convenience, new services and educational opportunities. The key is to "find the appropriate balance, recognizing privacy rights without unduly inhibiting commerce," he said.

Tight security

Catherine Allen, a vice president at Citicorp's office of technology, said the national network should have robust security features, such as encryption and smart-card access devices, to protect the integrity and confidentiality of home banking services.

She also argued for federal preemption of differing state privacy laws, so that privacy rules are uniform for interstate traffic.

The hearing was held by a Clinton administration group devoted to finding out what guidelines or legislative changes are needed to protect privacy on the NII.

Privacy police

Privacy advocates are calling for a federal privacy board to oversee U.S. policy on information access and confidentiality. Edmund Mierzwinski, consumer program director of the U.S. Public Interest Group in Washington, said he supports creation of such an agency with regulatory powers, "not just an agency that puts out leaflets." Evan Hendricks, chairman of the U.S. Privacy Council, also urged the formation of a national privacy office, similar to a bill sponsored by U.S. Sen. Paul Simon (D-Ill.), so that "someone will be watching the store."

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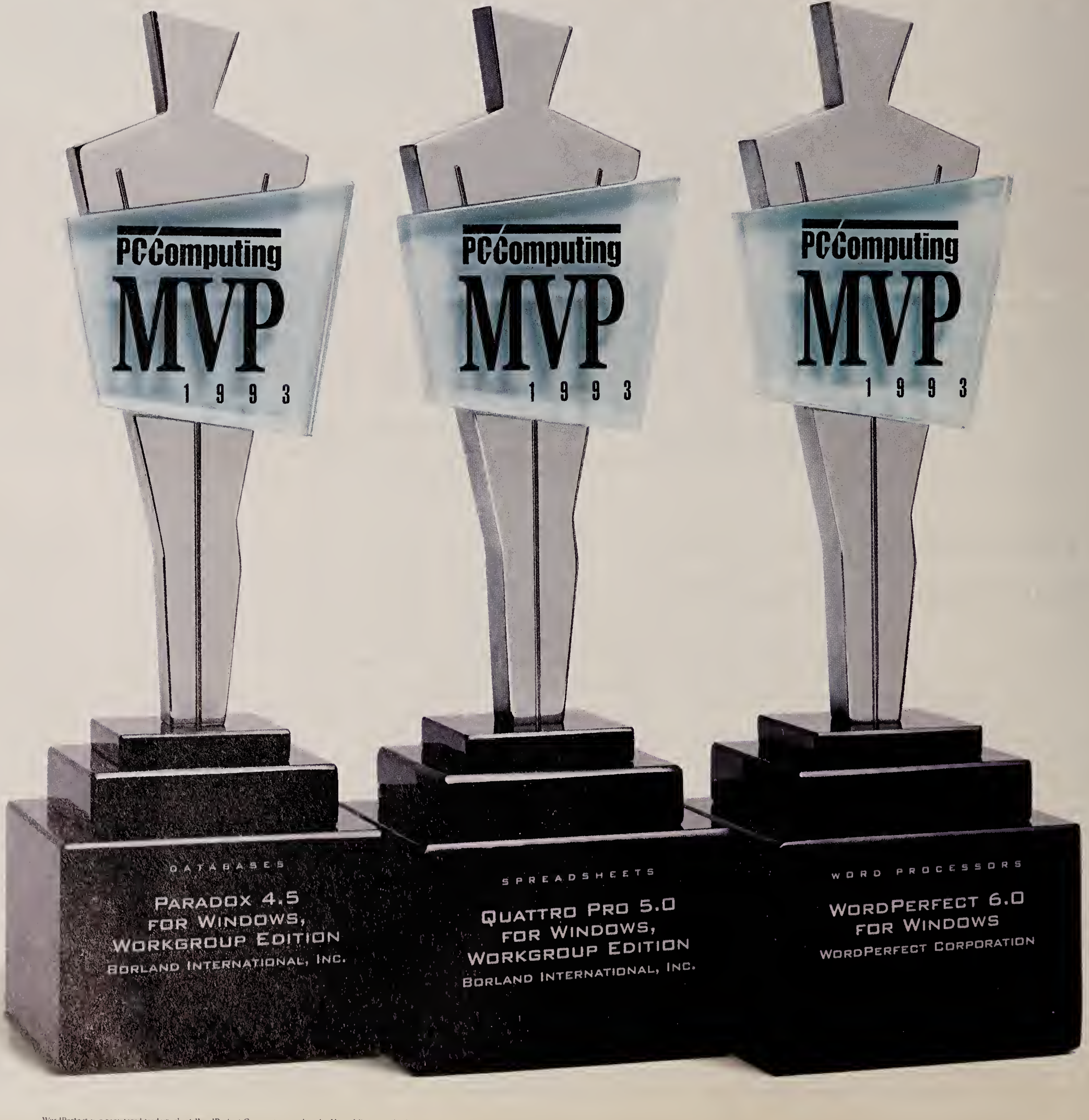

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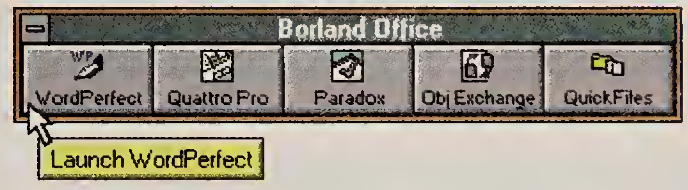

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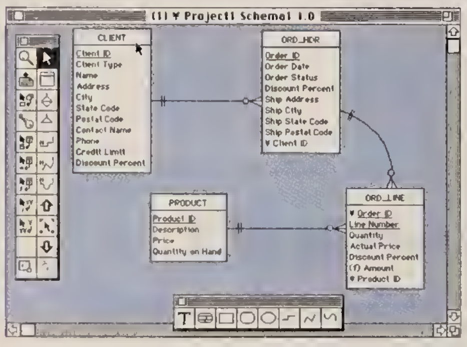

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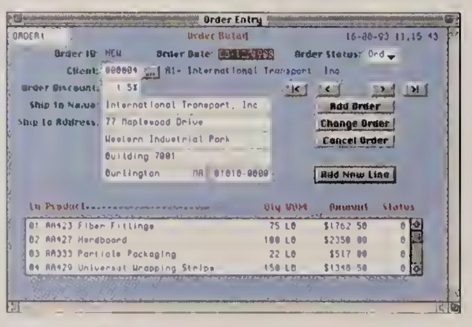
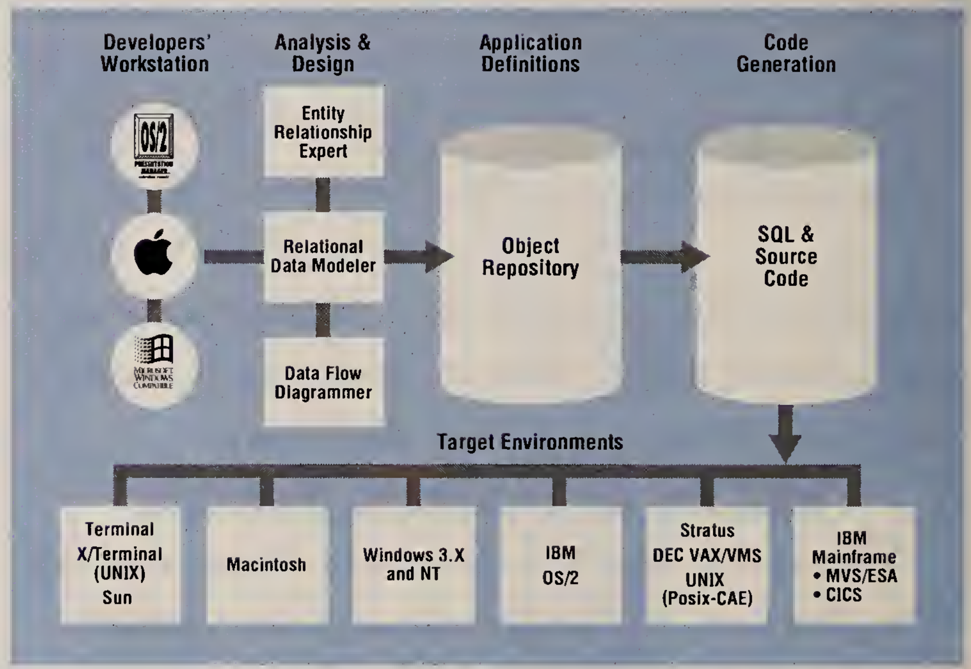


Order ID: NEW
Order Date: [illegible]
Order Status: Ord
Client: 000004 A1- International Transport Inc
Order Discount: 1 5%
Ship to Name: International Transport, Inc
Ship to Address: 77 Maplewood Drive
Western Industrial Park
Building 7001
Burlington MA 01810-0000

```
Ln Product                          Qty UOM   Amount   Status
01 AA423 Fiber Fittings              75 LB  $1762 50      0
02 AA427 Hardboard                  100 LB  $2350 00      0
03 AA333 Particle Packaging          22 LB   $517 00      0
04 AA429 Universal Wrapping Strips  150 LB  $1348 50      0
```

Executing in Windows, Macintosh or OS/2, SILVERRUN-developed applications have the graphical look and feel users demand.



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Sybase swings open gateway market

Purchase of Micro Decisionware to bolster mainframe link

By Kim S. Nash

Sybase, Inc. acquired gateway maker Micro Decisionware, Inc. last week in exchange for $25 million in stock. The move is an attempt to fill holes in Sybase's connectivity product line, analysts said [CW, Jan. 24].

Key for Sybase is Micro Decisionware's link to relational and nonrelational IBM mainframe databases, where roughly 80% of the world's data is housed, analysts said. "Few mission-critical client/server systems today can avoid talking to a mainframe, at least not at first," said Donald A. DePalma, an analyst at Forrester Research, Inc. in Cambridge, Mass.

Although Sybase's Omni SQL Gateway can link SQL Server users to relational databases from IBM and Digital Equipment Corp., for example, the product cannot get at data stored in nonrelational sources. To do so, users had to buy links from third parties, often from Micro Decisionware. An estimated 700 customers already have products from both vendors.

Users win

"This is a case of rivals teaming up for the better," said Regan Coleman, principle at Context Integration, Inc., an Emeryville, Calif., consulting firm.

The deal, which expands options for Sybase users looking to get Unix databases to talk to other systems, makes products from rival Oracle Corp. appear more insular, analysts said. Oracle offers a few products to shuttle data to and from Oracle and other databases.

"Despite what they say . . . Oracle doesn't believe in other databases," said Jeanette Sill-Holeman, an independent consultant in Woodside, Calif. "The dominant player always thinks he owns the marketplace." As a rule, a No. 2 player — Sybase, in this case — is more realistic about working with competitors, she added.

The acquisition also strengthens Sybase's ties with fellow SQL Server developer Microsoft Corp. Micro Decisionware is one of two Microsoft-sanctioned solutions for users looking to tie SQL Server for Windows NT databases to IBM systems.

Some users were surprised that Sybase waited this long to help users address client/server connectivity needs. "It's about time they did something," said an information systems director at a major oil company in Houston.

The firm has spent the last 12 to 15 months building several client/server applications that, for now, must access data on IBM mainframes at various sites. The development staff's goal, he said, is to build systems blind to which hardware platform the required data resides on. Micro Decisionware gateways are critical because they can format data to look like it came from a Sybase SQL Server, he said. "Even if the stuff is off a mainframe."

Not always a match

However, mainframe gateways are the wrong approach for some client/server shop applications, according to David Greenburg, director of new systems development at Orlando Health Care Group in Maitland, Fla.

The firm went live three weeks ago at the last of 13 sites with a 600-user client/server health care management application based on a Microsoft SQL Server. Greenburg tried using Micro Decisionware's gateway to IBM's DB2 but shelved the product after realizing that real-time connection to a mainframe only slowed users down, he said.

Instead, he rejiggered the application to use batch dumps of mainframe data that are a few hours old. Greenburg likened the functionality of Micro Decisionware's gateways to "trying to refuel an F-15 fighter jet with an old railroad car. Connecting your rock 'n' roll client/server system to an old mainframe is just too slow."

Sybase "looked at a number" of gateway makers before choosing Micro Decisionware, said Skip Glass, director of product marketing for interoperability products at the Emeryville, Calif., database developer. Rochester Software Connection, Inc., the other Microsoft gateway partner, was nixed, partly because it is smaller than Micro Decisionware and does not provide as much product breadth, Glass said. He refused to specify which other gateway players Sybase evaluated.

Meanwhile, Information Builders, Inc. offers EDA/SQL, a gateway to tie relational to mainframe databases. But analysts said the product is not well-entrenched in the market, having been sold mainly to existing users of Information Builders' development tools.

All together now

Sybase and Micro Decisionware aim to please users of most major databases and operating systems when products from the firms are melded this year

Micro Decisionware	Both	Sybase
Standards		
• DRDA	• ODBC • DB-Lib*	• XA • DCE
Databases		
• SQL/400 • SQL/DS • DB2/2 • Teradata	• DB2 • Oracle • IMS • IDMS • Adabas • VSAM	• ISAM • RMS • Ingres • Informix
Operating Systems		
• Windows NT	• OS/2 • Unix • IBM host	• NetWare

*Sybase Gateway technology

Super absorbent

Sybase will try to avoid the culture clash it faced in absorbing other firms, such as SQL Solutions, by making Micro Decisionware an independent subsidiary. No layoffs are expected; in fact, Micro Decisionware plans to add about 30 people to its 105-member head count this year.

Melding the two firms' products will not be difficult because Micro Decisionware gateways are already built on Sybase's DB-Lib standard, said Skip Glass, director of product marketing for interoperability products at Sybase. By comparison, integrating products acquired from Gain Technology was tough because of disparate architectures, he acknowledged.

Copyright infringement

Wang slaps user with lawsuit

By Craig Stedman

Wang Laboratories, Inc. has filed a copyright infringement lawsuit against a California customer, alleging the company refused to pay an operating system license fee required by Wang on purchases of used VS computers. A small number of additional suits are "imminent," according to Wang.

The suit was filed Jan. 19 in the U.S. District Court in San Francisco against Optical Radiation Corp., an Azusa, Calif., maker of eyeglass lenses and other optical products with annual sales of about $160 million.

Wang, which still depends heavily on the fading VS line while it tries to become an open software vendor, charged the company with violation of copyright laws through unauthorized use of the VS operating system on a used machine that it purchased in December 1991.

Rinda Iascone, a senior attorney at Wang, said the purchase came during a period when Wang was enjoined by a federal judge from charging the tiered operating system transfer fees, which range up to $100,000 and were set in early 1991. The legality of the fees was being challenged at the time by a used VS dealer.

According to Iascone, Wang provided Optical Radiation and other used VS buyers with temporary licenses at the old flat-rate transfer fee of $1,000 but warned them that the full amount would be charged if the court challenge was decided in its favor. The case against Wang was dismissed in June 1992.

Settlement possible?

Mark Livingston, Optical Radiation's corporate counsel, declined to comment on the copyright infringement suit last week. Neither he nor Iascone would discuss reports from sources familiar with the case that a settlement was being negotiated and could be agreed on shortly.

Lew Brentano, an analyst at Computer Intelligence/InfoCorp in Santa Clara, Calif., estimated that used machines account for about 15% of the VS installed base. Iascone would not say how many customers bought used systems when the injunction against the tiered fees was in effect, but she added that "a couple" more suits could be filed in the next few weeks.

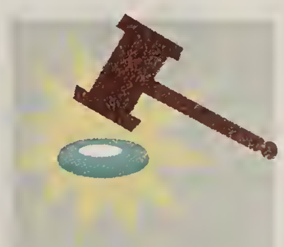
Both Brentano and Bob Sakakeeny, an analyst at the Aberdeen Group in Boston, described Wang's resort to the courts as unusual. "It seems like the last thing a vendor would ever want to do," Brentano said, although he added that the suit can be viewed as a matter of protecting intellectual property rights.

Given the dwindling interest in the VS line, though, Brentano and Sakakeeny said they do not expect the legal action to have much impact on Wang's efforts to find new customers for its imaging-oriented software products. Some VS users said they have ambivalent feelings about the lawsuit.

"I don't like the idea of a vendor suing a user," said Matt Konopka, MIS manager at Ellis Coffee Co. in Philadelphia. "On the other hand, I thought Wang made some pretty clear guidelines that they would pursue things like this. It sounds like they're doing exactly what they told users they were going to do."

Bert Regensburger, director of MIS at Jewels by Park Lane, Inc. in Schaumburg, Ill., said the suit is similar to application vendors going after software pirates. "But that doesn't mean I agree with it," he added. "It's an operating system that they're no longer going to improve, so why not just keep customers happy?"

The used machine that Optical Radiation bought replaced a VS system installed in 1986, according to Iascone.



Wang said it wants Optical Radiation to pay a $55,000 VS license fee; the suit seeks at least $100,000 in damages plus court costs. "We're not in the business of suing our customers, but the property is ours," said Joseph Tucci, Wang's chairman and chief executive officer. "We're protecting the assets of the company."

It answers calls
It will send pictures
It takes orders day and night
It's future-ready
It guides customers through orders
It answers questions
It automatically faxes receipts
It asks customers what they need
It will master new skills
It will link voice and data
It will fax info at any time
It will think for itself
It records special instructions
It has extraordinary room to grow
It gives you choices

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NCube piggybacks on Oracle plans

MPP maker is hoping to ride multimedia lane of info highway

By Kim S. Nash

■ After "flirting with profitability for the past year," massively parallel processor (MPP) maker NCube expects to escape red ink in 1994. But the turnaround — which would come after a decade of losses — would not be due to the blossoming of the MPP market.

Rather, NCube owner and Oracle Corp. chief executive officer Larry Ellison will have wrenched the struggling company out of its hole by bestowing upon it millions of dollars worth of information highway business.

Right now, NCube machines are the only systems supporting the software that Oracle sells to telecommunications and media companies interested in starting up video-on-demand, home shopping and other interactive television services. By default, NCube will get most of, if not all, the business generated by Oracle partners such as Bell Atlantic Corp., US West and The Washington Post Co.

"Having a billionaire and someone who happens to be one of the leading missionaries for the information highway as your primary investor has some benefits," noted Gary Smaby, president of The Smaby Group, Inc., a consulting firm in Minneapolis.

It's only natural

Buying NCube hardware was a natural extension to Bell Atlantic's choice of Oracle software, said Arthur Bushkin, an executive at the telecommunications giant. Furthermore, no other hardware would have been available in time to meet Bell Atlantic's aggressive plans to start interactive TV pilots immediately. The firm expects to deliver commercial systems by the fourth quarter of 1994, he said.

A multiyear Bell Atlantic deal alone is worth "tens of millions of dollars" to Oracle and NCube, Bushkin said. NCube executives declined to say what portion of the proceeds from these lucrative deals will go directly to the company. But they predicted that the business will bring NCube into the black.

Then again, profitability may not be such a notable achievement. When a single MPP machine can cost upward of $20 million, just one deal can double last year's revenue, Smaby said.

All for science

NCube's 400-user installed base runs the MPP boxes for largely technical applications, such as ING Bank International's financial analysis program.

Larry Ellison, *NCube owner and Oracle Corp. chief executive officer*

Bigger than ever

The NCube MPP boxes to be used by Bell Atlantic and others will sport more than 1,000 processors each, making them the largest systems NCube has sold to date, the company said.

Nobody's talking now

Tight-lipped officials at the private company declined to specify sales or losses for the 10-year-old firm, saying only that NCube will likely be profitable this year. Revenue for 1994 is expected to be double that of 1993's estimated $25 million, said Ron Buck, vice president of marketing at NCube. By comparison, sales for 1993 were 50% higher than for 1992, he said, adding that he anticipated a loss for fiscal 1993.

NCube has recently changed its selling strategies in an attempt to drum up business in the commercial market, rather than the scientific market. NCube customers include ING Bank International in the Netherlands and several universities worldwide, primarily handling complicated financial and environmental modeling applications. Riding Oracle's information highway coattails may be just the ticket NCube needs to further diversify its business.

Video server business has more — and more immediate — potential than a languishing supercomputing market, Smaby said, citing recent financial troubles at Kendall Square Research and Cray Research, Inc. "NCube would be foolish not to take advantage" of the business Ellison is throwing its way, he said.

NCube's goal is to provide data to fiber and cable networks with the speed and data integrity that will allow streams of video, audio and/or text to be routed to home viewers.

Ellison said that he likes to compare NCube's cost-effectiveness with that of Silicon Graphics, Inc. (SGI), which provides both set-top boxes and servers to interactive television pilot programs in Orlando, Fla. Sending movies through SGI's computers costs between $3,000 and $5,000 per video stream, compared with about $600 per stream for NCube/Oracle setups, according to Ellison.

But NCube boxes are not ready to hit the information highway. Hardware tuning still needs to be done to ready the systems for commercial use, Buck said. The major work will be in improving I/O throughput and jiggering memory processors to hit the $600/video stream target cost that Ellison is looking for, Buck explained.

Migration on the way

Although Oracle has promised to port Media Server and Media Objects software to other MPP and symmetrical multiprocessing machines, the company set no timetable for the migrations.

Media Server is an umbrella term for database modules designed to run on MPP machines and manage images, full-motion video and CD-quality sound. Media Objects is a development kit for building applications to run across the server.

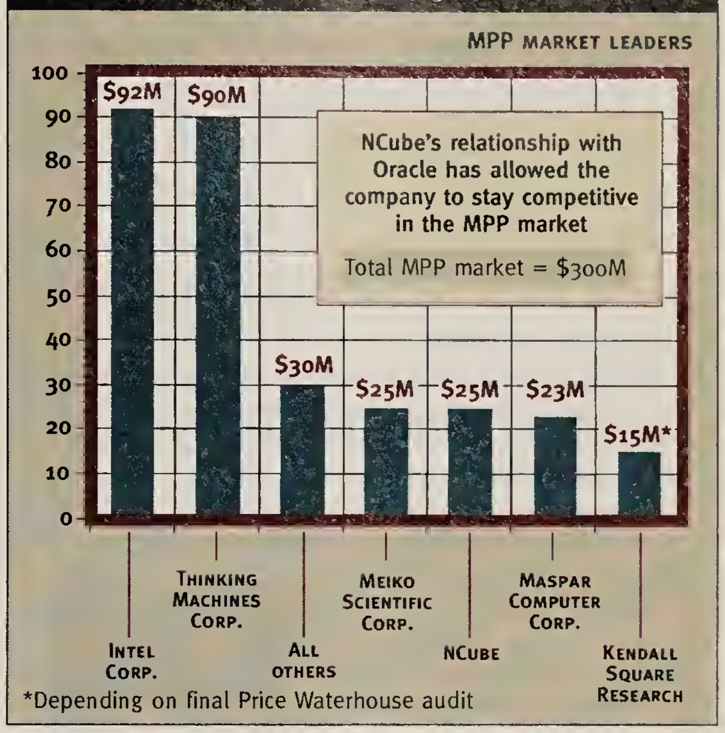
"I'm sure the engineers at Oracle working on MPP versions of the database are sincere in their desire to be platform agnostics," Smaby said, "but in reality, everyone knows that Larry has a substantial personal investment" in NCube.

In fact, Ellison owns the company outright, which he recently acknowledged to Cable Network News and which an Oracle insider confirmed. He has invested about $60 million into the company over its 10-year existence, one source said.

Crevice of money

MPP is not even a niche but a crevice, said Smaby Group consultant Gary Smaby. He tallied total 1993 sales for the giant computers at about $300 million worldwide.

Trying to keep pace



Source: The Smaby Group, Inc., Minneapolis

Fourth-quarter earnings, calendar 1993

Once again, those companies primarily focused on microcomputing technologies experienced strong financial performance in the recently completed quarter, while those involved with large-scale systems are still suffering

COMPANY	REVENUE OCTOBER THROUGH DECEMBER	PERCENT CHANGE FROM 1992	NET INCOME OCTOBER THROUGH DECEMBER	PERCENT CHANGE FROM 1992
Comdisco, Inc.	$536M	(6.1)%	$21M	(10.5)%*
Compaq Computer Corp.	$7.2B	76%	$462M	116%
Computer Sciences Corp.	$621.4M	2.1%	$21.7M	15%
Lotus Development Corp.	$278.3M	13%	$29.6M	103%
Pyramid Technology Corp.	$60M	9%	$.635M	36%
Sequent Computer Systems, Inc.	$104.3M	17.6%	$(15.1M)	NM
Stratus Computer, Inc.	$148.1M	10%	$(17M)	NM
Storage Technology Corp.	$400.2M	(5)%	$6.3M	NM
Tandem Computers, Inc.	$475M	(1.6)%	$24.9M	42%
Unisys Corp.	$2.1M	(4.5)%	$.118M	(16)%

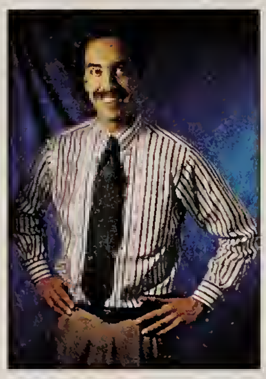
NM - Not meaningful *Includes a gain of $20M following adoption of SFAS 109.

Editorial

Big box redux

Is it just my imagination or is the age of reason and enlightenment fast approaching? It seems that after suffering through the dark ages of hyperbole, overselling, misrepresentation and outright fraud, users are now being sung a different tune by vendors, analysts and others about client/server computing and the real world.

For example, at a recent vendor briefing by Novell, executives flashed an overhead that said, essentially, that any relation between client/server and costs savings is purely coincidental.



Several research firms and consultancies in recent months have nearly tripped over one another to rush out their user-based studies showing that networked PCs are not replacing mainframes, or even running many applications formerly run on mainframes.

I've even read in some PC publications stories of client/server "failures," or at least efforts characterized as such when measured against the lofty cost-cutting, large system-replacing goals set before implementation.

And what of the mainframe? Despite a drop in big box sales in its last quarter, IBM also said it was surprised by a late quarterly surge in mainframe orders that caught it off guard and which it could not fill. Unisys sold more mainframes in 1993 than in 1992.

What the heck is going on? What is responsible for this new age of reason?

For one thing, customer experience has shown that in these early years of client/server computing, the emphasis will not be on replacing large systems and proprietary networks. The goal will be to develop new systems running new applications that dovetail as smoothly as possible with the installed base worldwide of $1 trillion worth of proprietary systems run by legacy people.

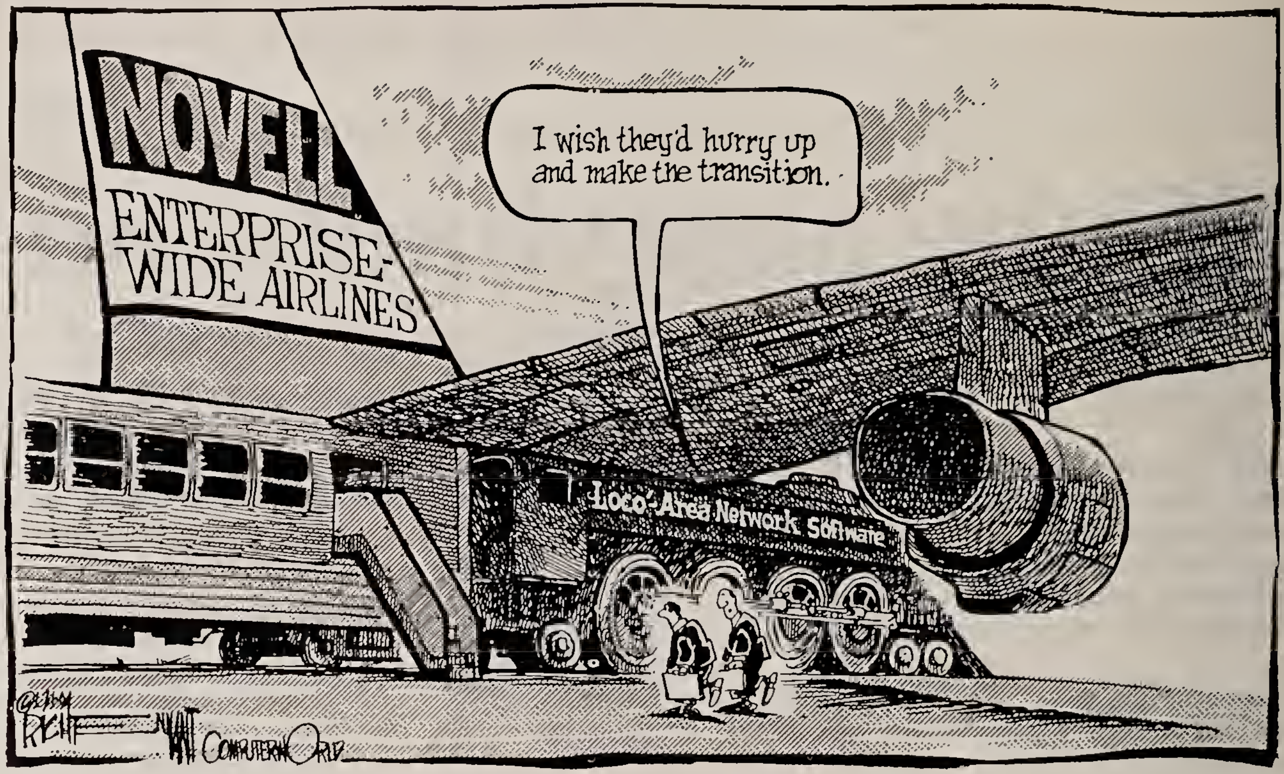
Also, experienced users such as Spiegel [CW, Jan. 24] know that big iron can make a dandy server, especially when you've already paid for it.

Finally, as users discovered when trying to kick-start PC nets after the Los Angeles earthquake, a more structured mainframe mentality and maintenance procedures can be invaluable when applied to the less disciplined PC LAN environment.

Two weeks ago at a client/server expo and conference, a poll of 125 IS executives revealed that all had installed client/server pilots or applications, but only one had junked his big iron. It's hoped that now the rest of them can begin to feel better about their very prudent decisions not to.

Bill Laberis

Bill Laberis, *Editor in chief*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ENTERPRISE-WIDE AIRLINES
I wish they'd hurry up and make the transition.
Loco-Area Network Software
COMPUTERWORLD

Letters to the editor

The non-stick 'standard'

One word rings loudly throughout your special report on the state of "open" systems, "Braving open roads" [CW, Dec. 6, 1993]. The word is "standard."

I think the real issue here is one of definition, and the "s" word tops the list of misused buzzers in our industry. The best way I can illustrate this is to quote an individual who had an uncanny knack of "pulsing" society:

"We cannot invent standards that will stick; what we mistake for standards are only fashions, and perishable. We may continue to admire them, but we drop the use of them."
—Mark Twain

Whit Davies
Alpharetta, Ga.

Encryption: a road to the info highway

Michael Schrage's "Controlling the keys to the kingdom" [CW, Jan. 10] missed an important point regarding the manner in which encryption can be a broadening influence to open commercial use of the "information superhighway."

It's true that "staff meeting at 2 p.m." is not a proper candidate for encryption. But don't throw out the baby with the bathwater. If encryption isn't encouraged, a memo stating "The price of widgets will be $3.45 per unit next week" will be passed around only on paper

Maybe a better example would be a resume. You need a certain level of confidentiality but would like several divisional personnel departments to get a copy. An encrypted job offer could combine network access and confidentiality.

The next level of use of encryption is electronic data interchange, electronic funds transfer and business negotiations in general.

A business person would want to discuss terms and prices with each customer and supplier in a confidential manner. Using electronic mail rather than paper mail would be faster and more efficient, but only if encryption were easy and widely available.

Dick Heyman
Fort Collins, Colo.

Put management glitz on the shelf

Regarding Capers Jones' article "Sick software" [CW, Dec. 13, 1993], his list of ways to prevent management malpractice misses a key point.

Let's ask those in the personnel department to forget the glitz of the latest management fad and instead, challenge them to apply their expertise so prevention is done before and after projects, not during.

Ask the software engineers what they need. If the answer is "nothing," have the courage to stay out of the way.

John Prumatico
Gulf Breeze, Fla.

Lowball pitches are hit by sponsors

"Unconventional wisdom" [CW, Dec. 27/Jan. 3] reported a study indicating 64% of project managers are not well-prepared to develop estimates.

As I learned the hard way with a former employer, those "ill-prepared" project managers are probably the ones savvy enough to realize that the only way to sell a project is to lowball the estimates, get the project approved and then let the cost run over.

The truth is that people of normal intelligence who have been working in the field 10 years don't estimate the costs — they *know* the costs. The project sponsor is too often to blame for tolerating the rubber ruler in building their portfolios because he rejects information systems investments with realistic costs and buys only the lowball "estimates."

Dan Evans
Consultant
Westwood, Mass.

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Re-engineering: Don't miss this train

Frank Monteleone

Can it be only a year ago I was told to stick to my knitting and drop all this crazy stuff about re-engineering? "Business process re-engineering is too *cosmic* an idea for senior management to understand," was what I heard. "Besides, information systems organizations exist to put in and support systems, not redesign the business."

Now, thanks to *Fortune, BusinessWeek* and various airline magazines, re-engineering is the *in* thing.

If you don't think business process re-engineering is part of your job, you'd better start looking for another line of work.

Process models and work-flow maps have appeared on meeting room walls and whiteboards worldwide. Consulting companies are doing a land-office business, having repackaged old services under new process-sounding names. It's not too cosmic anymore. In fact, if your organization isn't re-engineering at least five processes at a time, you are decidedly uncool. If you haven't sat down and read Michael Hammer's book, you are a geek.

IS organizations are all over the map trying to find their place in this new process mania. Some are leading it, some are following, some are resisting and some are on the outside looking in while consultants work directly with the leaders of their organizations.

Some of the IS people I have talked with say they are too busy re-engineering their internal IS processes and don't have enough resources to work on business process re-engineering right now. That's scary. That's the "We are the world, we are the data center" syndrome rising again. We can't afford that kind of backsliding.

What IS has to offer (or had better develop fast) is an understanding of the impact information and technology has on business processes. Here are a few examples of how I think we can make a difference:

- **Breaking out of the linear:** So much of work is still designed around sequence. Technology allows work to be performed in parallel or asynchronously, coordinated over time and location in ways not possible before.

Our understanding of what's possible using workgroup computing, distributed databases and telecommunications is important in the redesign of process. It can bring the whack on the side of the head needed for real breakthroughs.

- **Information as an asset:** Most information in organizations is not being managed today, by technology or any other means. This represents an enormous opportunity to leverage intellectual capital to effect process change. "Information is power" is a path to organizational extinction. Information is powerful only if shared in a way that helps meet customer needs.
- **External focus:** Our organizations aren't the only ones with processes. Our customers, suppliers, partners and competitors have them, too. We must form information-sharing and process-sharing alliances with our counterparts in related businesses.
- **The human resource:** Information technology not only empowers process, but it also empowers the people performing the process. Or it can, if redesign is approached with a clear vision of process, human resources and information resources as a triad.

It is now evident to business leaders that information technology is critical to their organizations' future, but they're not sure *how*. We must help them to figure that out. If we aren't part of the solution, we'll be history.

Monteleone is strategy, planning and technology director at The NutraSweet Co. in Deerfield, Ill.

IBM's comeback may be a mirage

John Gantz

I love the idea of IBM's comeback. My kids each own five shares of stock (bought when it traded at $120). My parents-in-law are both retired IBMers. And I have made a living the last 20 years, in part, because of IBM. So, I'm glad to see signs of revitalization.

Lou Gerstner's impact is finally being felt deep within the organization. For proof, read the interview with him and associated articles in the Jan. 17 issue of *Computerworld* or do what I have done over the last few months and visit several IBM sites. Reorganization is under way. The stock has picked up value. Downsizing is keeping Wall Street happy, and yet morale has picked up.

But I wonder. . . . I have this uneasy feeling that the current upbeat tempo inside IBM and in the customer base may be less the result of a cure within IBM than a collective sense of relief at the cessation of a painful therapy. In the long run, IBM customers may pay the price.

When I talk to IBMers about the renaissance, I hear about the PC Co.'s comeback, the RS/6000 and the AS/400, OS/2's success against Windows NT and an expectation that the cost cutting of the last few years is about to pay off. Despite the empty desks around them, they seem comfortable with a flattened management structure.

But I also hear approval of the recentralization of operations that Gerstner has embarked upon — the rolling of OS/2 product development in with that of other operating systems, the establishment of a high-level Corporate Executive Committee to set integrated strategies across the lines of business and so on. He's putting the brakes on the decentralization commenced by his predecessor, John Akers.

What gets me worried is why this feels so good to IBMers, who were never comfortable with the anarchy of decentralization. Going back to a more centralized structure, albeit with fewer layers from top to bottom, must feel like stepping into a pair of old slippers. But is it really good for the company?

What now looks like a comeback might turn out to be a rerun of past mistakes.

The arguments for recentralization sound logical — the technology is converging, customers want integrated solutions, networking requires product integration, duplication of sales and marketing is wasteful, yattayattayatta. But the fact that they sound logical, doesn't mean they are right.

Recentralizing the organization won't change the need for product lines to develop brand identities, compete with other brands (even IBM's) and work with products (NT and Windows) from competitors. Doing so under central coordination will automatically lead to the development of internal rules and regulations — a comfortable regime for most IBMers, but one not necessarily in the best interest of my kids and in-laws.

Gerstner says he is only responding to customer desires, but the customers, too, may be falling into the "old slippers" trap. Who howled the most when the Bell System was deregulated? Telecommunications managers who had built careers dealing with AT&T. Yet, 10 years later, who would really contend that U.S. businesses aren't better off under divestiture?

So, if you feel good about the way Gerstner is rationalizing the IBM structure, think twice. It may be a feeling that won't last.

Gantz is senior vice president at International Data Corp., where he is responsible for all research and consulting in desktop automation and workgroup and office computing.

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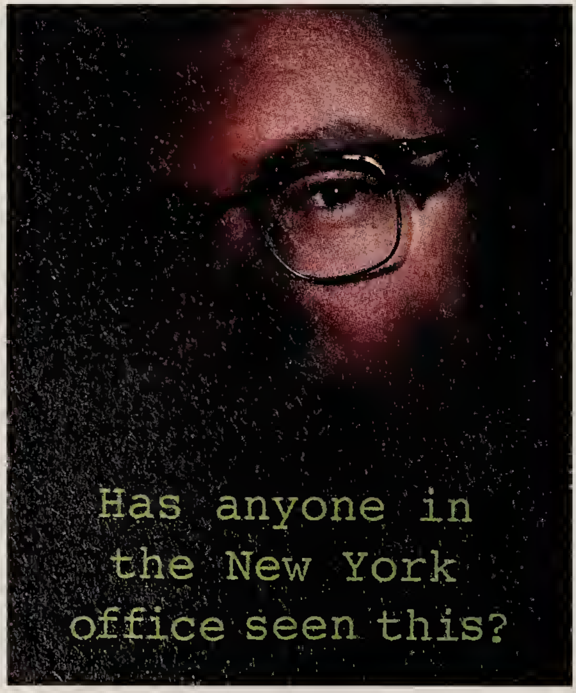
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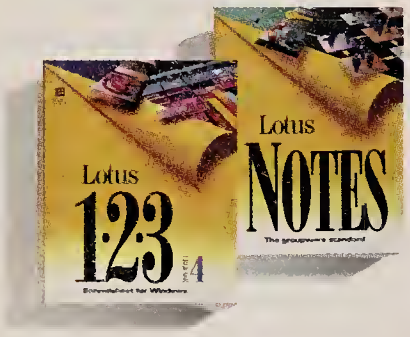

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PC identification system may sink software pirates

By James Daly

A software company claims it has come up with a way to make it virtually impossible to illegally copy PC software, a crime that industry groups say costs application developers billions of dollars a year.

SoftCop International, Inc.'s technology works by identifying system characteristics that are unique to a software purchaser's PC. The software checks this "thumbprint" when it is called on for use and denies access if it does not match.

SoftCop President John Totten said the Burlington, Ontario, company has talked about licensing deals with dozens of major developers and expects to see the technology integrated into off-the-shelf software by autumn.

A real bargain

The simplicity of software piracy has created a daunting challenge to developers. Most PC users can copy a $500 program onto a $2 disk in seconds. "We're the only industry that empowers every customer to become a manufacturing subsidiary," said Ken Wasch, executive director of the Software Publishers Association (SPA).

How large is the problem? That is impossible to tell, but the Business Software Alliance (BSA) in Washington said unauthorized software duplication costs application developers $12 billion in lost sales each year. "We estimate that as much as 35% of the software used in the U.S. may be illegal," said BSA spokeswoman Kim Willard. "Piracy is the single greatest threat to the success of the software industry."

The problem is dramatically worse overseas. The BSA estimates that more than 86% of the software used in Japan may be pirated and that an incredible 99% of the software used in Thailand is illegal. "Software pirates are our No. 1 competitor," said Tom Lemberg, chief counsel at Lotus Development Corp.

Fair warning

If the SoftCop technology enjoys wide licensing, it could help alleviate the problem. First-time users of SoftCop-empowered software will see a screen explaining that the software is protected against illegal copying for their benefit. They will also receive a toll-free number to validate and activate the software.

An operator will ask a number of questions to determine the system's thumbprint. Developers may also allow the software to be used on more than one machine — such as for those who use one PC in the office and a portable on the road — and adjust licensing fees accordingly.

There may also be a trickle-down benefit for end users, said Tony Moran, a vice president at SoftCop. "Ultimately the cost of piracy is borne by the licensed user,

Piracy, *page 43*

Communicators

Agent technology stirs hope of magical future

By Michael Fitzgerald

General Magic, Inc. has graduated from provider of vaporware to creator of actual demoware, and in the process has generated a level of excitement not seen for an unshipped product since everyone thought OS/2's future was bright.

Telescript, a groundbreaking communications protocol, uses intelligent, roaming agents designed to do the user's bidding. General Magic officials recently promised that Telescript, along with a new operating system called Magic Cap (see related story page 43), will be available in the coming months, though neither is yet complete.

General Magic's plans are predicated on the idea that computers should be easy to use and that their main use is communicating — be it thoughts, information or dental appointments. But with the company still unable to deliver a product, the question is, just what is it that makes people salivate about this particular pot of technology soup?

Agent in action

General Magic will send intelligent agents from personal communicators to other systems where they will help to execute an application

Shopping application on a personal communicator

"The potential is enormous," said Ken Dulaney, an analyst at Gartner Group, Inc. in Stamford, Conn. "[It] is a whole new way of doing computing."

It is possible that General Magic also showed a whole new way of doing business. Company officials said Telescript is to networking what Adobe Systems, Inc.'s PostScript is to printing — a ubiquitous service that makes communications quick and easy.

They also said that applications of the future will be services that run over a Telescript network, not the kind of stand-alone applications we see today.

Branching out

Technically speaking, the intelligent, roaming agents represent Telescript's new way of doing things. Marc Porat, General Magic's chairman and chief executive officer, said the fundamental difference between Telescript's agents and those employed by other vendors is that Telescript sends agents out of the system; others, such as Microsoft Corp.'s Intellisense scripting language, stay within the system.

This intelligent agent technology is the main reason that AT&T, one of General Magic's backers, will use Telescript as the basis for a new communications service called PersonaLink. This will be the first major public use of Telescript. A version is Telescript will also be incorporated into AT&T's EO personal communicator.

Telescript's intriguing message structure could provide an early reason for users to buy intelligent personal communicators such as the EO, personal digital assistants and other

Magic, *page 43*

Database joins files from multiple applications

By Michael Vizard

A little-known software company is out to change how users work with their PC files with the release of an object-oriented database that tracks the relationships between files stored in different applications.

CrossTies for Windows from CrossTies Software Corp. in Dallas functions as an information manager by including pointers from the database to all information in a PC related to any particular topic.

On top of that, it presents a user interface that becomes the primary viewing tool for calling data, regardless of whether it is stored in a spreadsheet, word processor or presentation graphics package.

For example, a user looking for information about a particular project would query the database to bring up all the related data. Since the object database has already established all the joins across all the files related to that project, it can present the user with that information as a single document, said CrossTies chief executive Steve Bakke.

Just like paper

Artec Elegant Designs, Inc., a millwork manufacturer and residential design company in Springfield, Mo., has adopted CrossTies to manage the relationships between PC applications such as spreadsheets and word processors and the computer-aided design files it uses to design products.

"We use it to organize and manage our computer files the same way we organize and use our paper files instead of using archaic computer file names. That's the way I want to work," said Artec co-owner Tim Dobyns.

"On any project we might have two drawings, two spreadsheets and a half-dozen documents. CrossTies allows us to find everything related to that customer and also serves as a contact manager," Dobyns said.

Dobyns noted that CrossTies took some getting used to since it effectively controls your entire PC.

"It took some time to adjust to because it makes you want to relearn how you deal with your PC. Your natural tendency is to want to control, and until you get used to this, you're scared you'll lose control over your files," Dobyns said.

CrossTies for Windows, which was announced last week at Documentum, is priced at $149. It will be available on Feb. 14.

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Commentary

Carole Patton

Numerical disorder

Something has been bothering me, and with so many upgrades now hitting the shelves, I figure it's time to complain. Here's the beef: Too many software vendors are misleading customers with phony version numbers.

Remember when a version number meant something? Software tagged "Version 1.0" was new and exciting, but immature. You didn't bet the farm on its dependability. Generally, the higher the version number, the more stable and supportable the product.

Well now you can forget about any such rules of thumb, thanks to software vendors' "creative" numbering. Last fall, for example, Borland's first Windows spreadsheet package, Quattro Pro 1.0 for Windows, was replaced with Quattro Pro for Windows Version 5. No, Virginia, there never was a Version 2, Version 3 or Version 4. According to Borland, this numerical leap was needed to provide "consistency across product lines." Of course, it also made Quattro Pro more competitive against Microsoft's newly released Excel 5.

The same sort of leap to implied maturity also occurred over at Lotus last fall when its flagship spreadsheet product, 1-2-3 for Windows, was upgraded. Overnight, Release 1 was superseded by Release 4. What about Releases 2 and 3? Well, my guess is that Lotus took a good look at the inroads Microsoft's Excel 4.0 spreadsheet was making into corporations and decided that if Microsoft was selling a Version 4, then so would Lotus.

No vendor is immune to this game. When Microsoft updated its Word for Windows word processor, Version 2 was replaced by Version 6. This occurred right after Microsoft competitor WordPerfect shipped its latest Windows version, called WordPerfect Version 6. For shame! This kind of posturing needlessly confuses new users and irritates everyone else.

More is less

Another thing: Now that upgrades are arriving more frequently, installation has become more frustrating.

For example, I got my copy of Norton Desktop for Windows Version 3 from Symantec just a few weeks ago. After upgrading from Version 2.2, I found that the customized Quick Access groups had disappeared from my desktop. (This, immediately after reading in the new manual that Quick Access had gotten "even smarter.") Since the ability to customize groups of files and manage my PC's desktop is probably my main motivation to use Norton, I wanted my old groups back.

With some finagling, I managed to locate my old Quick Access files, which all have a .QAG extension, and was able to drag them from a drive window onto the main Quick Access window. But why didn't Symantec's upgrade modify and move my .QAG files for me? An upgrade shouldn't require me to rebuild my entire desktop.

As for new features, I found Norton's Day Planner, which includes a calendar, a to-do list and a phone book, half-baked. The phone book cannot dial my phone, which is a useful feature that planners such as SideKick, Windows Cardfile and Desktop Set have long offered.

What's more, there is no viewer for files created with Microsoft's Word Version 6, which shipped at about the same time as the Norton product. Why can't vendors communicate about this stuff?

Symantec isn't the only offender, not by a long shot. When I upgraded to Word Version 6, I also found unwelcome surprises. The most annoying: None of the Word 2 macros for templates such as letters and memos work when moved to Word 5. Apparently, Microsoft has changed some of WordBasic's syntax, thus making these templates nonfunctional. Isn't it time for a truly modular application architecture that lets the user decide which upgrade features to install?

Of course, some upgrades are so buggy it's best just to stay away. That's the case with WordPerfect for Windows Version 6. There are so many bugs in this release that the company is promising to put out an interim release by March. If you use WordPerfect for Windows Version 5.2, don't upgrade yet.

The Ferengi file

Update: A couple of columns back, I asked if anyone knew what "Ferengi," IBM's code name for OS/2 for Windows, really means. I was flooded with replies, but my favorite, and I believe the correct response, came from reader Joseph Munoz. He wrote: "The term probably comes from the television series *Star Trek: The Next Generation* and *Star Trek: Deep Space Nine*. In these series, the Ferengi are a humanoid race whose sole purpose in life is making profits. The Ferengi have extremely large ears, which also serve as their erogenous zones."

Why IBM wants to be associated at any level with large-eared, money-grubbing aliens is anyone's guess.

Patton is president of the Mendham Technology Group in Mendham, N.J., which produces client/server summits for corporate strategists. Her MCI Mail address is 401-4869.

Digital adds energy-saving sleep mode to PCs

Company makes late entry into expanding 'green' desktop market

By Craig Stedman

Digital Equipment Corp. has belatedly joined the "green" PC revolution by making its entry-level PCs compliant with the federal government's Energy Star guidelines for power consumption. The DECpc LPV models now include notebook-like power management features.

Jesse Parker, director of product management at Digital's PC business unit, said the energy-saving capabilities will be extended to the higher-end DECpc LPX and XL machines by June. All three lines will include the capabilities as standard items, he added.

Still green at being green

Parker acknowledged that Digital "took a little extra time" to go green compared with most major PC vendors. Green systems, which began appearing in the first half of 1993, reduce energy consumption by going into "sleep mode" when not used for a certain period of time.

Lagging behind other vendors has not helped Digital with its image as it tries to move into the ranks of leading PC vendors, according to Richard Zwetchkenbaum, an analyst at International Data Corp. (IDC) in Framingham, Mass. "Digital has got to be a little quicker on these things," he said.

Support for energy efficiency is fast becoming a key checkoff item for PC vendors, Zwetchkenbaum added. It is "pretty much a requirement" on federal government buys, and a mid-1993 IDC survey of 200 commercial and educational sites showed that almost 20% of their planned PC purchases during the next 12 months were expected to involve green machines, he said.

"It's really just a matter of time before all or a very large percentage of PCs will be green," Zwetchkenbaum noted. "It's more prevalent in the home and government markets now, but I think it's pretty much going to blanket the desktop PC."

The addition of the energy-saving capabilities to the DECpc family is a welcome step, according to Dave Yakerson, network administrator at Bridgeport Hydraulic Co., a private-sector water utility in Bridgeport, Conn., that relies on Digital for its desktop PCs.

"If that's going to become part of the standard product, it should encourage people who are DEC houses to look twice at using [the company's] PCs," Yakerson said. "There's nothing I hate more than walking by a PC at night and seeing that it's still on and draining down power."

Keeping pace

Both Zwetchkenbaum and Randy Giusto, an analyst at WorkGroup Technologies, Inc. in Hampton, N.H., said Digital does not appear to have broken any significant ground in green capabilities. But the company's machines do at least match what other vendors are shipping, they added.

The entry-level systems, now called the LPV+, are available immediately for the same prices as the LPV models, starting at $1,049 for a box with a 25-MHz Intel Corp. I486SX microprocessor, Digital said. That machine consumes about 26 watts of power in sleep mode; the Energy Star limit is 60 watts.

Models based on chips with higher clock speeds will use "a little more" than 26 watts but should be well within the guidelines, Parker noted. The LPX and XL machines are likely to fall closer to the 60-watt limit as their expansion slots are filled up, he added.

At your command

The power management features built into the LPV+ models are made possible by Intel Corp.'s I486SL series microprocessors, which originally were targeted at notebooks and other portables. Users can set their own energy-consumption levels via a graphical user interface window or DOS menu and specify how long the system has to be untouched before the monitor and/or disk drive go into sleep mode, according to Jesse Parker, director of product management at Digital's PC unit. Digital plans to ship the LPV+ systems with the power management capabilities turned off and let buyers decide whether to use them.

MathSoft provides spreadsheet alternatives

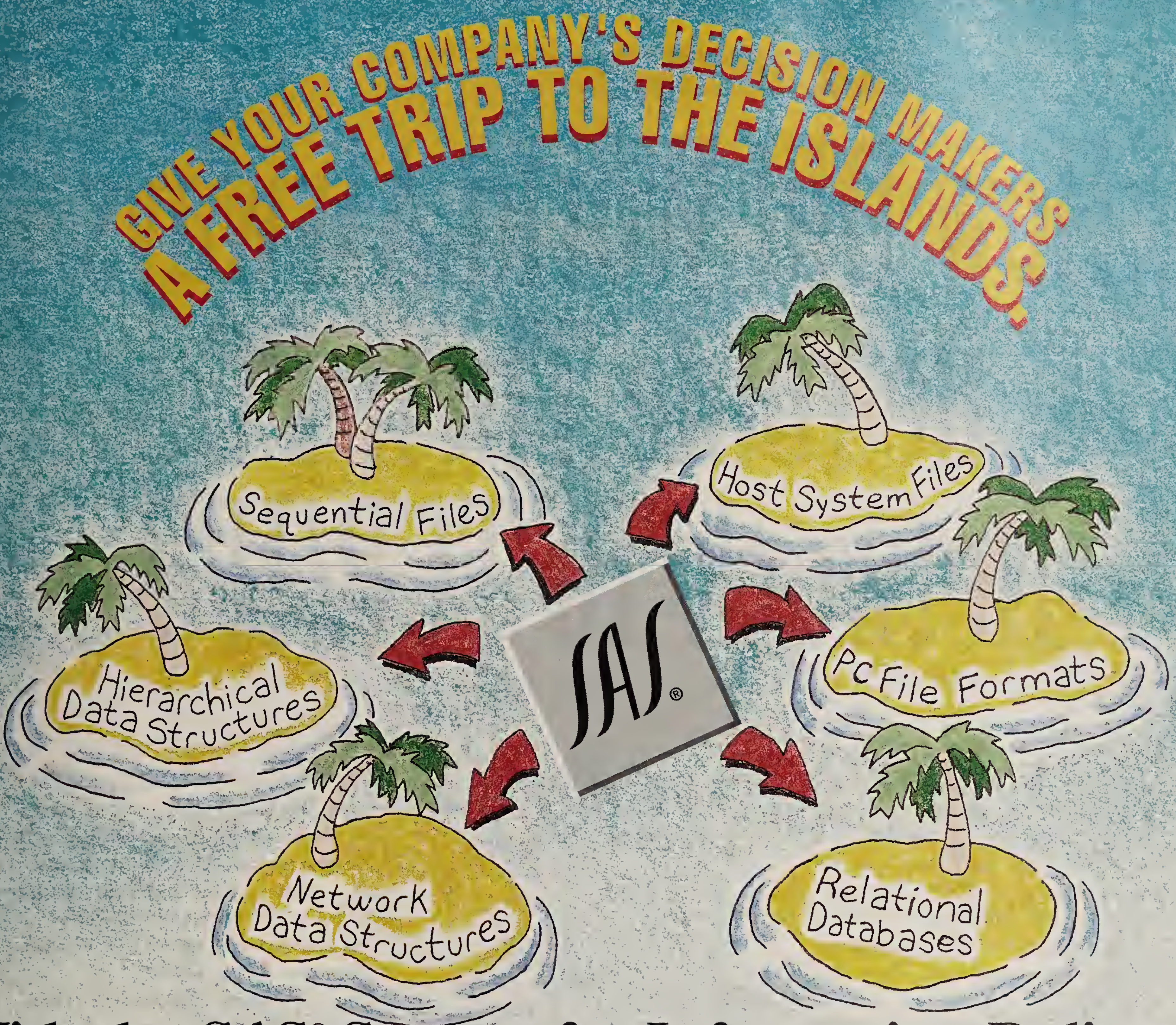
While spreadsheets are the predominant tool used for calculating values in commercial applications, mathematical modeling tools that were once exclusively within the purview of workstations are making their way to Windows environments.

MathSoft, Inc. recently restructured its mathematical calculation offering to include a $99 version of Mathcad 5.0 aimed at common math problems and a $299.95 version of Mathcad Plus aimed at people who incorporate mathematical formulas in larger applications.

"We're out to wean technical users off spreadsheets. The problem is that many people are using what are essentially ledger sheets to do technical calculations," said Allen Razdow, chairman and chief executive officer of Cambridge, Mass.-based MathSoft.

Thus far, Mathcad has an installed base of more than 400,000 units.

—Michael Vizard



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Magic

CONTINUED FROM PAGE 37

handheld devices.

Analysts said the agent technology will present a particularly powerful model for remote computing, especially in a client/server environment.

In a "client/server model where the client goes away, the message has to be smarter because the client isn't there to guide it," Dulaney said.

But no matter how good Telescript may be, it will have problems without broad-based industry support, analysts said. With only PersonaLink signed up, and that not even in existence yet, Telescript may find itself struggling for market acceptance.

Porat pointed out that AT&T is not a bad first partner to have. He stressed, however, that General Magic is not wedded to AT&T and is aggressively pursuing telecommunications firms and services providers. These include IBM and Microsoft and their upcoming electronic messaging services [CW, Dec. 20, 1993].

Still, analysts said agent technology, whether from General Magic or someone else, is the wave of the future.

"Agent technology is a much more efficient way to [handle networking] and the only way wireless is going to happen," said Kimball Brown, an analyst at Dataquest, Inc. Brown said object-oriented systems such as Telescript will eventually supplant procedural systems such as Lotus Development Corp.'s Notes.

Bruce Stephen, an analyst at International Data Corp. in Framingham, Mass., said he expects to see Telescript adopted by a wide variety of companies.

"Telescript is a big deal — it's a very alluring technology, and it certainly is the first major event in the handheld market in 1994," he said.

Not ready yet

General Magic's coming Telescript communications protocol may be receiving accolades as it nears maturity; however, its Magic Cap operating system is seen as cute but too young.

Magic Cap includes Telescript and a new, nifty approach to user interfaces.

The Magic Cap interface centers on the notion of an electronic community. The user starts by entering a "town" intended to be filled with icons representing stores and service organizations that offer electronic shopping from third-party developers. The town also features a user "house" with "rooms," including one labeled "desk." The desk room contains icons for a telephone, Rolodex, calendar, file cabinet and other functions.

Most analysts say Magic Cap will be pushed aside by the market weight of Microsoft Corp., which is readying At Work for Handheld Computers, codenamed WinPad, in conjunction with Intel Corp., Compaq Computer Corp. and VLSI Technologies, Inc.

Marc Porat, General Magic chairman and CEO, said analysts are looking too hard for a single operating system to win the handheld market. He said a 25% share is a reasonable goal for Magic Cap. "If we can't capture 25% market share we should jump off a bridge," he said.

Perhaps to its advantage, Magic Cap has been designed from the ground up to run on a variety of platforms, including PCs, handhelds, television set-top boxes and screen-based telephones; WinPad is a revamped, sealed-down version of Windows.

Some suggest that Magic Cap has a solid chance.

"It's very sexy technology," said Bruce Stephen, an analyst at International Data Corp. "It's fun and whimsical and could get a lot of attention."

"It has the graphical multimedia-type image that we're looking for," said Richard W. Chandler, director of computer operations at Radio City Music Hall Productions in New York. Chandler said Radio City was interested in Magic Cap because it may encourage potential ticket-buyers to interact with next-generation technologies such as multimedia kiosks. — *Michael Fitzgerald*

Piracy

CONTINUED FROM PAGE 37

who suffers when software companies have fewer funds to spend on further product development," he said, adding that developers who see increased revenue from crimping piracy may also lower prices.

The technology also reduces the possibility of illegal software turning up during a systems audit — a situation that can prove not only embarrassing but costly. The SPA has filed dozens of suits against companies that have pirated software. In February 1991, for example, the SPA announced a $300,000 settlement after a raid at the Chicago-based construction firm of Davy-McKee Corp. yielded pirated copies of software from Lotus, Software Publishing Corp. and WordPerfect Corp. [CW, Feb. 25, 1991].

Staffers at both the SPA and the BSA said they are working to make users aware of the many forms of piracy, including unauthorized duplication, downloading copyrighted software from bulletin boards and enticing dealers to load free software onto hard disks to sweeten a sale.

New Products

Intex Solutions, Inc. has introduced Trans Plus for Windows, a Windows utility that integrates external data into spreadsheets.

According to the Needham, Mass., company, the product intelligently converts most ASCII files into a spreadsheet file, then automatically launches the spreadsheet program and opens the file in a format that is ready to use.

Trans Plus for Windows is compatible with popular spreadsheet programs and supports standard ASCII text files, including those created by word processors, databases and mainframes.

Trans Plus for Windows costs $225.

▶ *Intex*
(617) 449-6222

Symantec Corp. has announced DiskDoubler 4.0, a compression utility for the Macintosh.

According to the Cupertino, Calif., company, the product doubles the capacity of hard and floppy disks. DiskDoubler 4.0 offers an Archive feature that combines files and folders into fully editable, multiple-file compressed archives.

The product also includes the ability to expand other compression formats and features compatibility with utilities and virus protection programs.

DiskDoubler 4.0 costs $79.95.

▶ *Symantec*
(408) 253-9600

Vycor Corp. has announced Release 2.5 of its DP Umbrella for the Windows SQL help desk product.

According to the College Park, Md., company, the product is an integrated help desk module that tracks personnel and client information including history, hardware and software, and wirepath and connectivity configurations.

Version 2.5 includes Microsoft Corp.'s Microsoft Mail support; configuration options to set counters in activity, personnel and component windows; task dependencies associated with an activity or work order; equipment searches for equipment items on any number of fields, including bar code and serial numbers; and a zoom feature in the help desk monitor module that allows a help desk operator to view caller information and any open calls.

Pricing starts at $7,995.

▶ *Vycor*
(301) 220-4450

Strategic Mapping, Inc. has introduced an updated version of Atlas GIS, its desktop mapping software for business applications.

According to the Santa Clara, Calif., company, Atlas GIS for Windows features advanced page layout and map control, improved map layer management and a user interface and database engine designed for Windows.

Atlas GIS for Windows can be used for building sales/distribution/service territories, analyzing target markets and planning direct marketing programs. Support for multiple map themes is provided.

Atlas GIS for Windows costs $1,595.

▶ *Strategic Mapping*
(408) 970-9600

Curtis Software Corp. has announced Catalog On Disk for Windows Version 2.20, a disk catalog authoring software package.

According to the Torrance, Calif., company, enhancements for Version 2.20 include on-screen ordering and importation. The product also provides a format viewer and modified product line files.

Complete product records can be copied to a buffer and pasted to create new records.

The standard edition of Version 2.20 costs $1,795.

▶ *Curtis Software*
(310) 320-2451

Stairway Software, Inc. has introduced ScreenExtender 3.0, a screen utility.

According to the Virginia Beach, Va., company, ScreenExtender increases productivity by eliminating the left/right screen scrolling that occurs while editing a document that contains proportionally spaced, scalable or compressed fonts. The product supports expanded, extended and upper memory.

A single-user version of ScreenExtender costs $99.95. Network/multiuser packs are available in 3-, 5-, 10 and 20-user packs for $199.95, $299.95, $499.95 and $799.95, respectively.

▶ *Stairway Software*
(804) 437-7000

Product shorts

Alpha Software Corp. has introduced Report Styler AutoPrint, a systemwide product that lets users automatically add fonts and graphics to existing plain-text documents. Users can improve the look of structured reports, listings, forms, invoices and mail labels. Cost: $995 for an unlimited number of users, $495 for 25 users and $295 for 10 users. Alpha Software, Burlington, Mass. (617) 229-2924. . . . **Micron Computer, Inc.** has announced a line of Pentium-based Peripheral Component Interface (PCI) local bus systems. The systems were designed for advanced graphics and memory-intensive applications including multimedia, computer-aided design and desktop publishing. Standard features include PCI hard-drive controllers, doublespeed, Flash BIOS and a Microsoft Corp. mouse. Cost: $2,799 to $6,799. Micron Computer, Nampa, Idaho (208) 465-3434. . . . **CalComp** has announced full PostScript Level 2 language support for its ColorMaster Plus XF color printers. ColorMaster Plus XF features Level 2 capabilities such as data compression and device-independent color schemes. Users can print full-color images in sizes up to 11¼- by 17¼-in. on an assortment of paper stocks. The product is available in two versions. Cost: $5,495 for the 8½- by 11-in. version (Model 6603XF) and $8,995 for the full-size 11- by 17-in. unit (Model 6613XF). CalComp, Anaheim, Calif. (714) 821-2000.

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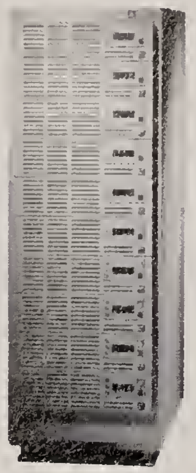

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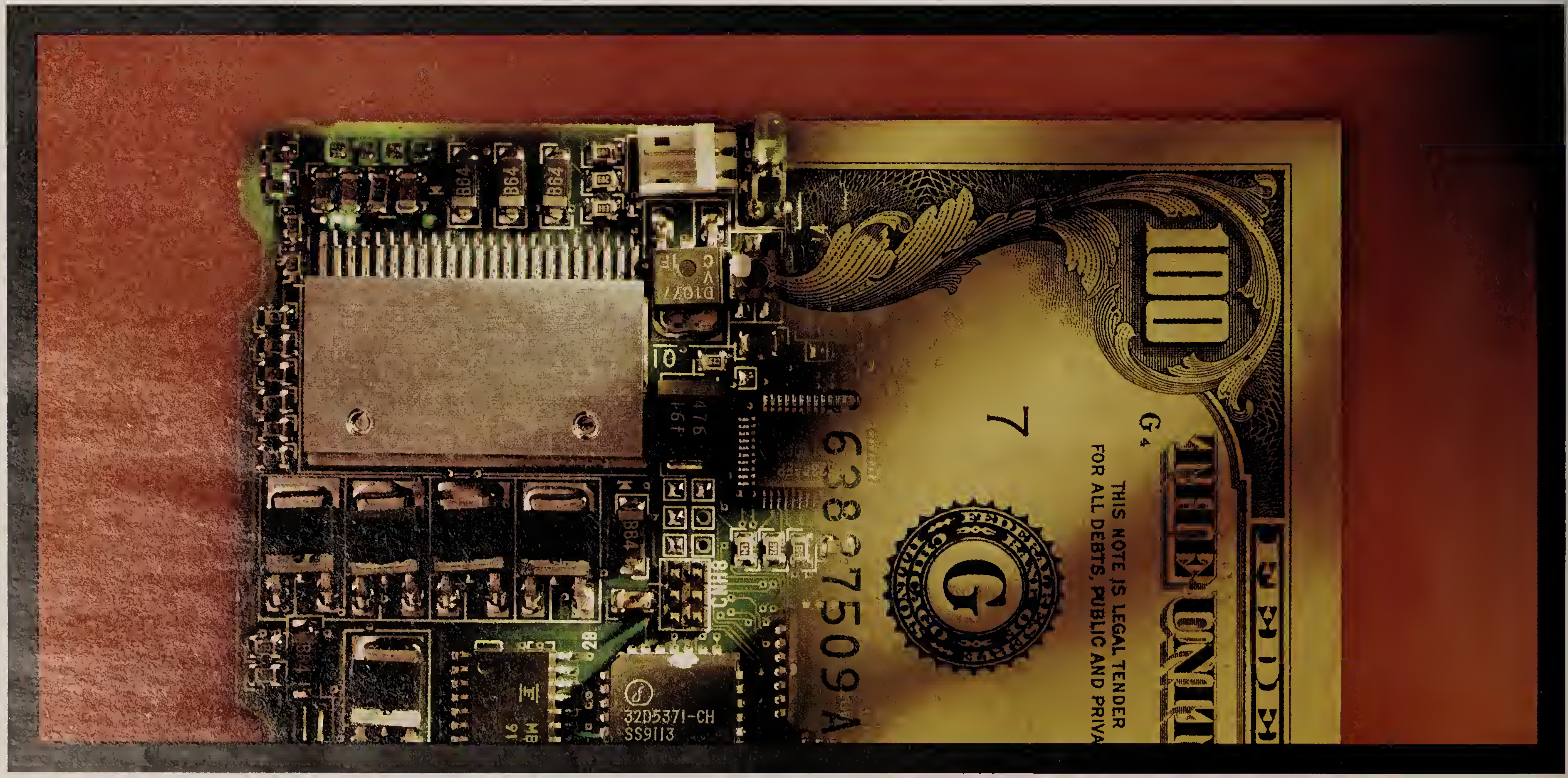

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WRITTEN INDEPENDENTLY OF COMPUTERWORLD

White Paper

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CORPORATION

Application Development Tools

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Introduction

The proposition is simple. Client/server techniques are increasingly used to incorporate information in applications that create competitive advantages.

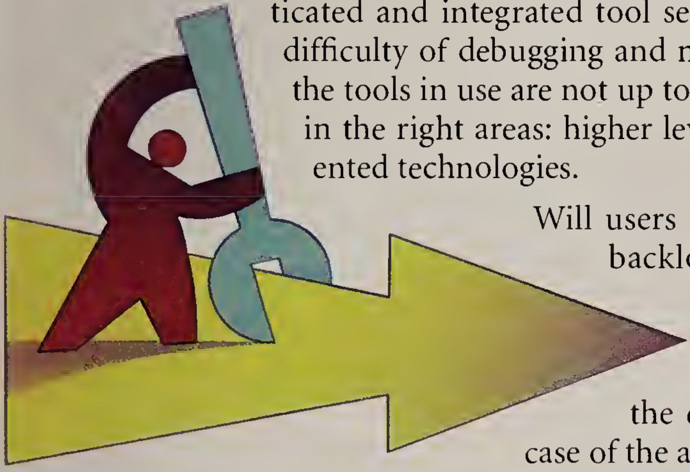
Using client/server tools is the only way that these applications can be implemented in the scale, complexity, budgets and time frames required to meet that goal. Winners in the race to capitalize on information will therefore be those sites that are early adopters of the more sophisticated client/server tools.

Are client/server applications just simple beginner systems? Not really. It is true that the inventory of applications becomes more and more complex as sites gain experience, but the first several client/server applications are likely to contain some complex features requiring special tools and expertise.

Are client/server applications easy to develop? No. But development efficiency is not a very important objective in the first place. Learning to deliver quality code in the new application architecture is the largest obstacle to overcome.

Is there one development scenario that ensures success? No, there are several. The appropriate development paradigms — team size and the extent of legacy code reuse — varies not only among sites, but from project to project depending on the application objectives and, of course, the quality of the legacy code.

Most importantly, what types of tools are most appropriate for the job, and are users employing them? The challenge posed by the applications calls for the use of the most sophisticated and integrated tool sets. Yet the persistent complaints from users about the difficulty of debugging and managing their applications is a clear sign that, overall, the tools in use are not up to the job. When new tools are adopted, users are looking in the right areas: higher level languages, specification repositories and object-oriented technologies.



Will users be able to meet the challenge? There is an increasing backlog of applications, and the number of users needing these applications is accelerating exponentially. In response, managers are retraining an increasing share of the MIS staff for client/server projects. But if this is the extent of the response, IDC predicts failure, as in the case of the artificial intelligence (AI) movement.

To be successful, developers must increase their productivity by multiples, not fractions. This calls for flexible, portable and maintainable tools, plus an understanding of the new techniques that go along with them. In the AI movement, tools and methodologies were complex and only understood by a small fraction of the development community.

The client/server movement is already far more widespread than AI. We predict it will flourish and, in the process, change the way applications are developed.

This White Paper is written by Anthony C. Picardi, director, software research, IDC.
For more information on the White Paper Program, please call 508-879-0700.

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WRITTEN INDEPENDENTLY OF COMPUTERWORLD

Application Development Tools

This white paper is based on both expert opinion and data collected from users. We took this approach because the enormous amount of vendor hype surrounding client/server computing often drowns out what few facts are known about the movement.

The issues surrounding complex tasks have to be discussed quantitatively. In this way, there will be not only answers, but some necessary perspective about the diversity of options and the confidence that can be placed on the facts.

IDC talked to a diverse array of individuals in several formats. We conducted a sample telephone survey of U.S. application development managers, directors or supervisors who either had client/server applications in production, or were developing applications to be put into production within two years. From this group, interviews were done at 280 unique sites.

The survey respondents are a diverse group in terms of operating environment, industry and site size. Fifty-one of the sites have an IBM mainframe, 144 sites have a minicomputer as their senior system, 228 have LAN environments, and 122 have workstations.

Since we selected the survey sample randomly from a *Computerworld* list of readers who claimed to be using or planning to use client/server development tools, IDC made no attempt to weight the sample. We assumed instead that the *Computerworld* list was representative of the entire population of individuals active in client/server computing.

Based on all the facts, there is no excuse for ignoring the client/server movement.

In addition, IDC conducted in-depth interviews among a small group of MIS managers in order to obtain anecdotal information about particular implementation experiences. Those interviews furnished the user case studies included in this paper.

SURVEY RESULTS

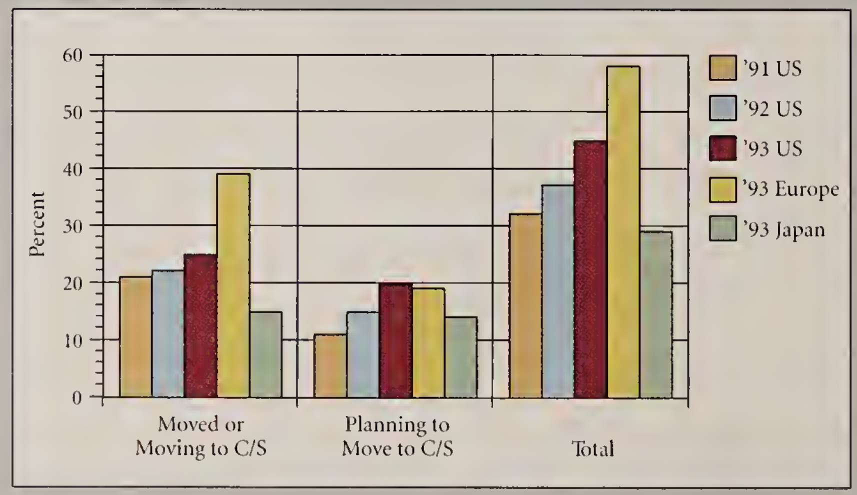
The survey shows that client/server activity is dispersed across all industry segments, a wide range of site sizes, and a diversity of operating environments. These results are consistent with previous IDC survey data. As a result, our editorial message to business professionals is clear: there is no excuse based on size, operating environment, industry or country for ignoring the client/server movement.

Extensive IDC Global Information Technology surveys at 5,086 sites in 1993 show a slow and steady trend in the commitment to client/server computing. Figure 1 shows data in two categories for three years in the U.S. as well as three geographic regions for 1993. Shown first is the percentage of surveyed sites that have moved or are in the process of moving their new development to client/server architectures. Shown second is the percentage of sites that are planning to move to client/server applications in the next year.

Note that the total percentage of sites thus committed (averaged over all medium-to-large sized businesses) increased in the U.S. from 32% in 1991 to 45% in 1993. Western Europe leads the world in overall commitment in 1993, with 58%, while Japan lags, with 29 percent.

EVOLUTION OF CLIENT/SERVER COMMITMENT IN THE U.S. AND COMPARISON TO WESTERN EUROPE AND JAPAN

FIGURE 1



Source: International Data Corp.

The client/server phenomenon is worldwide. It is not just the latest computer fad. In a technical sense, it is a way of designing applications to take advantage of desktop graphical systems networked with a variety of other systems.

But by being limited to the technical issues, the whole point is missed. The point is that this type of application architecture transforms the way information is used in organizations. It also allows users who participate in application construction to actually change the way they perform their jobs.

Increased Client/Server Activity

Survey data is subdivided into three groups based on experience levels. This is done for the purpose of examining factors that may change with experience. The three groups are:

- "developers," who are designing but have no client/server applications in production now
- "novices," who have one or two client/server applications in production
- "pros," who have more than two client/server applications presently in production.

Of the sites that have applications up and running, the average number of applications is 5.1. The average number under development is 3.5. The average number of applications expected to be in production two years from now is 14. This information shows that the investment in client/server computing is accelerating; and that the installed base will nearly triple in the next three years. Other IDC data shows that programmers will be retrained to meet the increased demand. While the client/server code base is currently nowhere near as large as the legacy code base, sites implementing client/server techniques are aggressive about development plans.

Enthusiasm for Client/Server Methods

Does the client/server strategy stand for rightsizing, motivated by the desire for greater efficiency within information technology (IT), or are there strategic reasons that transcend cost savings? We asked the respondents to characterize the role of client/server computing in their overall business strategy by rating a list of choices. The results can be found in Figure 2.

The most common choice is, "Client/server approach is a key enabler for enhancing end-user data access across the enterprise." Indeed, over a two-year period, user access to data consistently scores the highest of the motivations and benefits of client/server computing on IDC surveys. Not far behind in second place is, "Client/server method is a key enabler for major changes in our business processes."

These two strategic choices rate significantly higher than the next two: "Saving money in IT" and "Client/server technique is a more efficient development technology." Trailing far behind are "Client/server computing as an experiment" and "Client/server approach as a one-time fix."

Application Challenges

Survey respondents were asked to characterize into four classes their total inventory of applications, both in production and under development. The classes are:

- read-only/ad hoc query
- decision support
- non-mission-critical OLTP
- mission-critical OLTP.

The resulting data shown in Figure 3 is consistent with the business motivation data above. Notice that user access to data includes both ad hoc query and the more formal decision support activities. These together account for 53% of the client/server activity. Only 31% of the activity involves mission-critical OLTP.

Application Use Intensity

Respondents were asked to estimate the actual number of applications in production and development by the number of users per application. This is called "use intensity." While there are 121 and 167 sites that have applications in the first two size categories — one-to-10 and 11-to-100 — only 65 and 14 sites have applications in the 101-to-1,000 and above-1,000 size categories.

The 11-to-100 category contains the most applications because departmental information access applications are in this size category, and information access is the most popular application type.

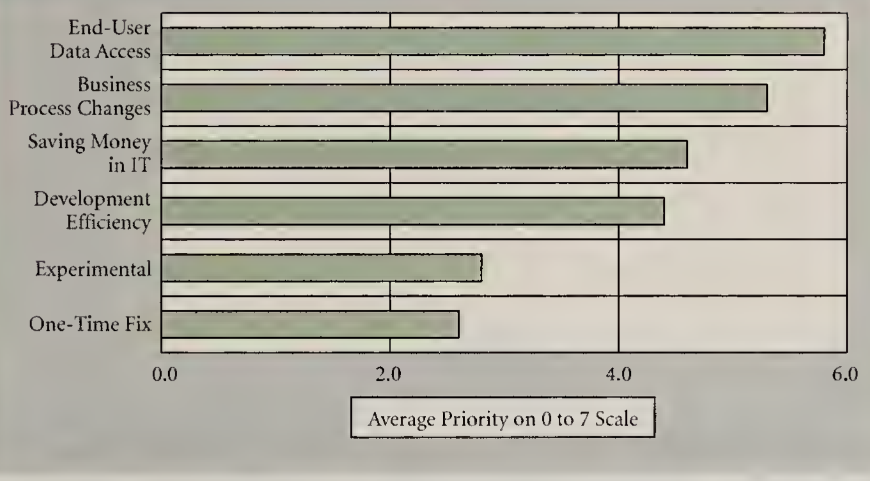
The average number of applications at the one-to-10 and 11-to-100 site category ranges between six and seven per site while the number of applications in the larger categories ranges between three and four per site.

To investigate the effect of experience on use intensity, we developed an intensity measure for a site's entire application inventory. The results indicate a very strong and significant relationship between intensity and experience.

The "pros" (sites with more than two applications in production) had, on average, an intensity score over three times that of sites in the "novice" (one or two applications in production) or "developer" (zero applications in production) groups.

THE ROLE OF CLIENT/SERVER COMPUTING IN OVERALL BUSINESS STRATEGY

FIGURE 2



Source: International Data Corp.

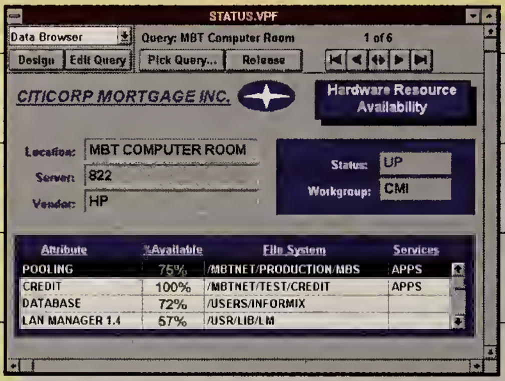
This data supports the evolutionary notion of client/server application development: sites tend to serve up larger and larger implementations as they gain experience.

Client/server computing is a key enabler for enhancing end-user data access across the enterprise.

Departments Lead the Way

It is significantly more difficult to implement and maintain a distributed application serving over 1,000 people than it is to manage one that serves 10.

The information supports the notion that these early adopters of client/server techniques are in the departmental-size category with the bulk of their implementations.



Query: MBT Computer Room

1 of 6

CITICORP MORTGAGE INC.

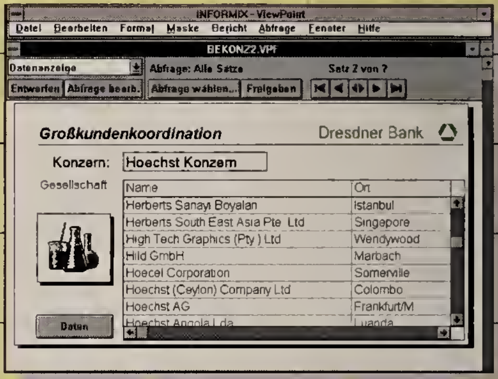
Hardware Resource Availability

Location: MBT COMPUTER ROOM
Server: 822
Vendor: HP
Status: UP
Workgroup: CMI

Attribute	%Available	File System	Services
POOLING	75%	/MBTNET/PRODUCTION/MBS	APPS
CREDIT	100%	/MBTNET/TEST/CREDIT	APPS
DATABASE	72%	/USERS/INFORMIX	
LAN MANAGER 1.4	67%	/USR/LIB/LM	

Citicorp's IS department uses INFORMIX-ViewPoint as part of a network resource tracking application. Over 100 users monitor system resources, identifying servers to run specific applications. The system also provides a network map for easy identification.

Network Resource Management
Citicorp Mortgage, Inc., St. Louis, Missouri



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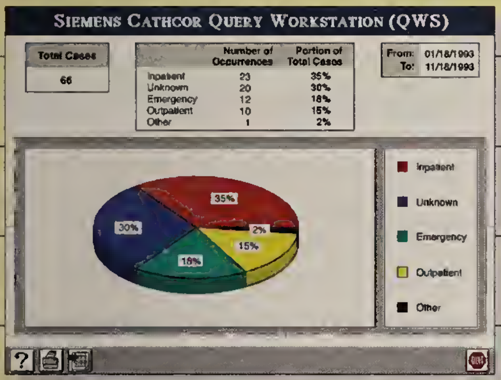


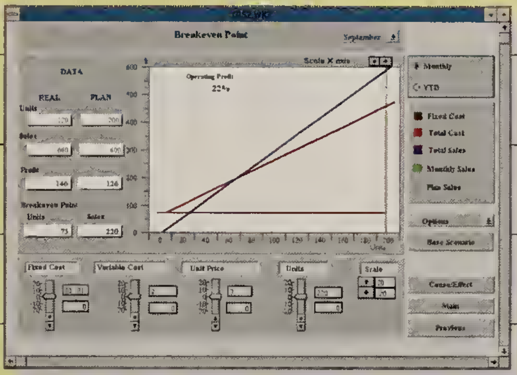
Total Cases
66

	Number of Occurrences	Portion of Total Cases
Inpatient	23	35%
Unknown	20	30%
Emergency	12	18%
Outpatient	10	15%
Other	1	2%

From: 01/18/1993
To: 11/18/1993

This HyperScript Tools application, developed by Informix VAR Microstrategy, Inc., is being bundled with Siemens hardware to provide a turnkey solution for the healthcare market. Cathcor Query Workstation allows healthcare professionals to access and utilize a wide range of patient information and records.

Healthcare Tracking/Reporting
Siemens, Munich, Germany



	REAL	PLAN
Units	120	200
Sales	660	600
Profit	146	126

Breakeven Point

Units	Sales
73	220

This executive information system, developed by Informix VAR Graphical Information, Inc., is used by Spring Industries—one of South America's largest mattress manufacturers. Company executives graph historical financial information along with projections based on current trends, and perform pricing and costing analysis.

Executive Information System
Spring Industries, Bogota, Colombia

If you're like most IT organizations, you're hearing more and more from your users about their need for information that's meaningful—and helps them make smart, competitive decisions.

That's why Informix has developed two new Windows™-based, graphical tools: INFORMIX-HyperScript Tools and INFORMIX-ViewPoint. Both are specially engineered to meet the information access and analysis demands of your knowledge workers and decision makers.

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- ✔ SuperViews hide database complexities from end users while MIS maintains control

HyperScript® Tools Key Features

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- ✔ Versatile screen painters for generating user interfaces
- ✔ Intuitive, English-like scripting language with SQL support
- ✔ Embedded spreadsheet for managing and manipulating data
- ✔ Powerful business graphics for analysis and presentation

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• **It's multiplatform.** You can develop and run HyperScript Tools applications in both Windows and OSF/Motif.™

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• **It's based on new SuperViews™ technology,** which hides the complexities of the database structure from users while allowing you to maintain database security and control.

• **It gives your users instant, timely access** to exactly the information they need to make decisions today.

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* *PC Magazine* November 9, 1993

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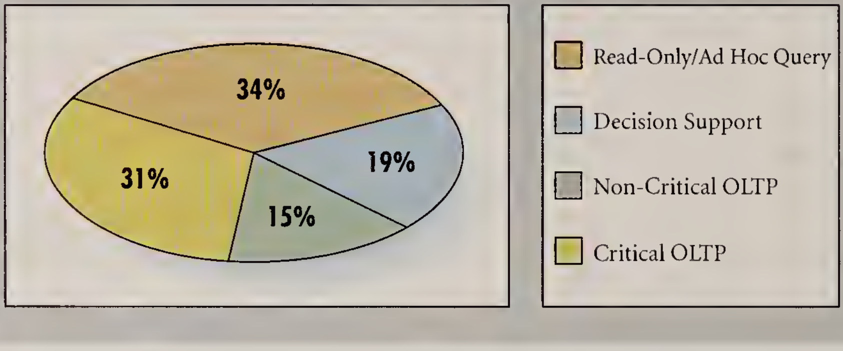
THE NEED FOR SCALABLE TOOLS

On-line transaction processing accounts for 46% of the total application development activity, although, as noted above, only 31% of this OLTP is considered to be mission-critical. Also, the number of users served by individual applications tends to increase rapidly as sites gain even two years of experience. What are the implications for client/server tools?

Client/server application developers should not avoid training delays in favor of quickly cobbling together their first applications based on the same third-generation language tools they used in the host environment.

TYPE OF INFORMATION PROCESSING FOR CLIENT/SERVER APPLICATION INVENTORY PLANNED AND IN PRODUCTION

FIGURE 3



Source: International Data Corp.

This shortsighted strategy results in a critical lack of scalability — the ability to roll out the application to greater numbers of users — and the possible additional task of completely rebuilding original applications.

Under any circumstances, successful applications must be able to deliver adequate performance in both the original environment and across environments.

Cross-environment capability is important in most medium-to-large sites where creating applications for more users means transcending operating environments, either in terms of DBMSs, desktop systems, host/server systems or network operating environments.

A scalable tool automatically generates code for target environments without requiring programmers to recode the application or, worse yet, having to learn the intricacies of multiple network protocols.

Tool Features

There are several important tool features required to realize adequate client/server performance in a single operating environment. First and foremost, make sure that the generated data access code automatically takes advantage of the performance features in the application database.

In addition, the tool must collect information (usually via the DBMS) on the performance impact of various transactions, so that it is possible to tune the transactions and complex queries.

Also, tools must logically specify data structures and transaction code so that they can be maintained as the database is regenerated. More sophisticated tools have the ability to automatically generate code that takes advantage of underlying performance attributes of several popular DBMSs.

Next comes tuning the application in the run-time environment. Developers must be able to target code modules among client and server systems based on performance considerations, and then to easily change this as the run-time topology changes.

The more sophisticated tools improve performance with automated memory caches or query optimization. Other tools facilitate performance prediction by simulating transactions under specified user intensities.

The ability to test applications for any cross-operating environment performance is also important.

IDC's detailed interviews highlight application testing as one of the most critical areas for improving developer productivity. Specification-based testing tools avoid the tedious task of recapturing regression tests for each environment. More sophisticated tools actually aid in the generation of test cases.

THE EVOLUTION OF CLIENT/SERVER APPLICATIONS

There are very definite groups of features that are implemented as sites gain experience, although there is no single well-defined path. A given site may very well start with one or more advanced features in a particular application. Overall, however, the diversity of a site's client/server application base increases as it gains experience.

At the first and most important rung of the evolutionary ladder are features for information access and application integration, windows interfaces, and operating across run-time environments. The emphasis on information access carries with it a need to transfer data into, and sometimes out of, spreadsheets and personal databases. There is also a need to integrate data with document management and groupware products such as Lotus Notes and various e-mail packages. Integration with production applications is needed to implement most business process redesign projects, as enterprises strive for horizontal functional integration.

Tools needed to meet these first-rung challenges go beyond simple GUI builders. The ability to generate code for both multiple operating environments and interfaces to existing production applications are the keys here.

Desktop Requirements

Desktop application integration may involve the following functions: simple generation of data readable from personal databases and spreadsheets; the more complex task of automating functional tasks via agents and user scripts; or support for both reading and writing via Open Data Base Connectivity (ODBC)-compliant gateways.

The second tier of requirements focuses on multiple databases from the same vendor at the same site and the procedural complexity of the application. Procedural complexity comes from putting the users in full control of applications. Event-driven control frees users from the constraints of performing tasks in the exact order specified by the application and in synchrony with all other users.

Users can thus work when they want and decide which queues to service. This, in turn, often requires multi-threaded capabilities to handle autonomous procedures that operate in the background in response to demand queues.

Most developers do not want to choose unique tools for implementing client/server procedural code, preferring to stick with C or COBOL. This is the reason for a large part of the enormous training effort users claim comes with implementing client/server applications.

3GL Drawbacks

Writing procedural code at the 3GL level requires developers to deal with the implementation intricacies of the network, as well as SQL code, message passing, the operating system and transaction monitor specifics of each of the multiple target environments. This must be done because environmental knowledge is key to efficient applications.

Writing procedural code at a higher level in 4GL or CASE tools that generate code for multiple environments avoids much of this training time. This is illustrated by one interview site that used Texas Instruments' Information Engineering Facility to redesign an application for client/server computing with very little redesign and virtually no new training.

Furthermore, the more graphic the procedural specification, the easier it is to maintain. One of the appeals of object-oriented tools is that they make it easy to modularize interaction processes via classes and associated methods. This greatly facilitates maintenance and reuse.

Data Diversity

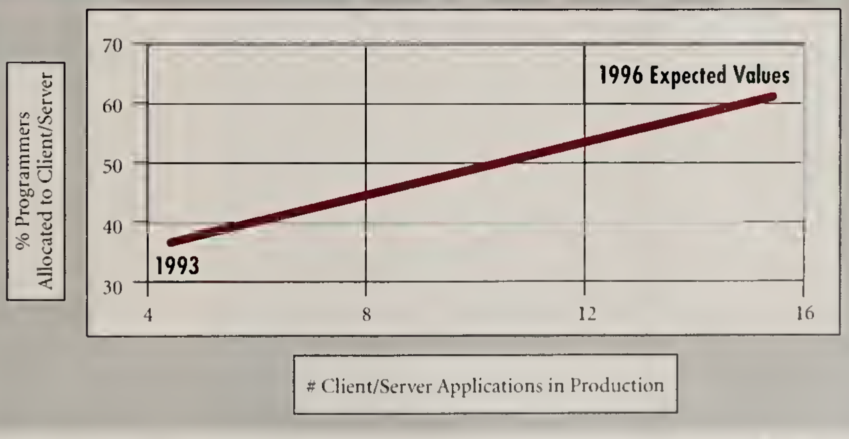
The third tier of application complexity includes a set of features that mainly focuses on data diversity and presentation. Distributed, same-vendor DBMS is followed by distributed multivendor DBMS. At this point users need to capture information from external sources and federated companies.

As applications are increasingly rolled out, users will want to use the enterprise messaging backbone to broadcast analyses. Static images stored in databases will be as important as graphic workflow metaphors for user interfaces. Text input will give way to interactive graphics. These include maps, hierarchy charts and flow diagrams that can be "adjusted" as data capture devices. Procedural complexity is increased further by the addition of batch procedures often involving computational manipulations.

> *Most developers do not want to choose unique tools for implementing client/server procedural code, preferring to stick with C or COBOL.*

ALLOCATION OF PROGRAMMING STAFF WITH THE INCREASE OF CLIENT/SERVER APPLICATIONS IN PRODUCTION

FIGURE 4



Source: International Data Corp.

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Limited Tool Choices

Users reaching this level of sophistication will find that their choice of development tools has suddenly decreased from several dozen to only a few. Assuming the user has already invested in a specification-based 4GL or CASE tool to climb the first two rungs, the search is limited to the few tools that can support a specific set of capabilities.

These capabilities include automated generation of code for multiple run-time and DBMS environments. They also include maintaining distributed referential integrity internally as well as among mixed databases.

At this level of complexity, the user needs relational DBMS extensions for storing and retrieving images. While image storage is possible with most modern relational DBMSs, these databases differ markedly in the way they handle distributed data and more esoteric functions.

For example, ASK/Ingres offers a spatial class library for special manipulation of image components. Oracle, ASK/Ingres, Rdb, and Sybase offer differing varieties of data gateways and features designed to manage heterogeneous and distributed data.

The Final Rung

Users consider features such as machine and mobile interfaces, expert system logic, multistep transactions, animation and voice storage to be relatively unimportant. These are features that we expect to find in vertical industry applications developed by value-added resellers for specialized markets.

For example, expert system logic is used for pattern recognition to identify physical resources in satellite photos, and voice storage is incorporated with mobile processors for field data collection in forestry or criminal investigation applications.

RESOURCE ALLOCATION

The average number of developers at respondent sites is 27. This number ranges from one to 1,000 and is heavily influenced by 10 of the largest sites with 200 or more developers. Half the sites have six or fewer developers. Respondents are currently allocating 38% of their total development staff to development and maintenance of client/server applications. They expect that to increase to 60% in 1996, as shown in Figure 4. This growth will match the nearly three-fold increase in the expected number of client/server applications in production. Making the conservative assumption that the average number of de-

Writing procedural code at a higher level in 4GL or CASE tools that generate code for multiple environments avoids considerable training time.

velopers at the sites remains at 27, this produces a 60% increase from 10 to 16 per site between now and 1996.

Data indicates that only 16% of these developers were hired specifically to work on client/server projects. The rest have been retrained, as will future developers. This heavy reliance on retraining existing staff for client/server activity confirms other IDC survey data collected over the past two years. Managers say that, on average, it takes at least seven months to convert a conventional host-based developer to client/server projects.

At this level of complexity, users need relational DBMS extensions for storing and retrieving images.

CODE DEVELOPMENT STRATEGIES

In all, we found no significant expectation of change in client/server application development during the next two years. The most popular single strategy is the development of totally new applications with little or no reuse of legacy application, procedural or database code. This is indicated by 34% of respondents. Seventeen percent are migrating the entire application to a new environment with only minor redesign. We do not expect these migration patterns to change.

The legacy database will be around for some time. Fully 46% of current development efforts involve some use of original application databases. This includes adding GUIs and migrating procedures with use of the legacy DBMSs.

This number will remain static since respondents claim 47% of their development efforts will involve legacy DBMSs two years from now. The legacy database is identified as supporting the original host-based application, not necessarily a mainframe DBMS. Only 18% of the sites have resident mainframes. The implication is obvious: database gateways will continue to be important for client/server tool selection among a large portion of the user community.

Teams and Code Reuse

The IDC study investigates developer team size and code reuse between projects. It finds that code reuse is still not the norm. By a small but significant margin, 54% to 45%, development strategies that do not involve code reuse are still more prevalent than any type of code sharing among teams.

Twenty-six percent of the non-reuse group is composed of sites that use single developers working on isolated projects, while sites that use small project teams working on self-contained projects with little code reuse follow closely at 25%. Sites that have large teams working on separate parts of larger projects with little code

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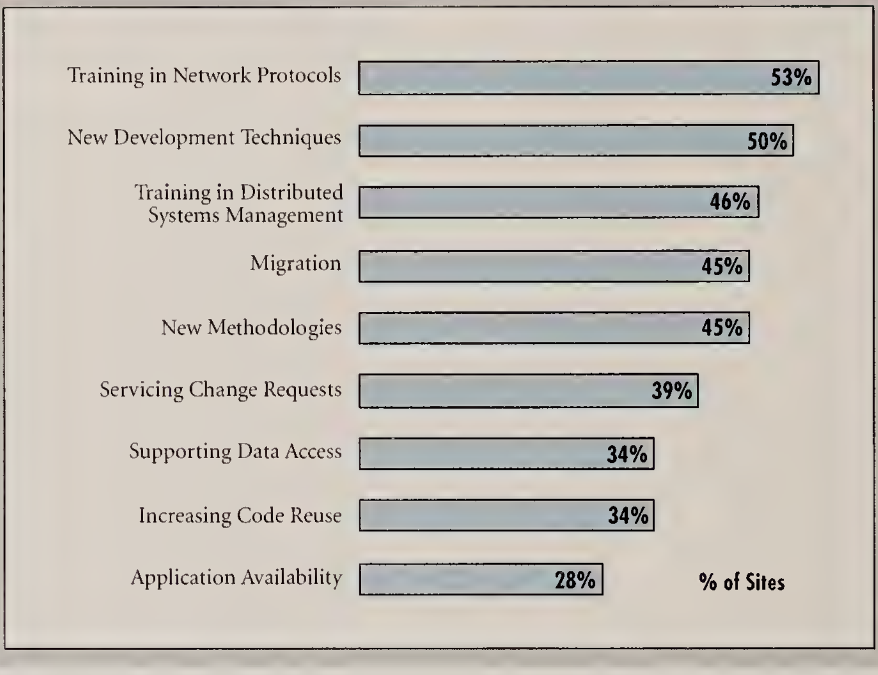
DIFFICULTIES IN DEVELOPING AND MAINTAINING CLIENT/SERVER APPLICATIONS

FIGURE 5



Source: International Data Corp.

reuse make up 3% of respondents. Small teams dominate sites that reuse code. Thirty-eight percent of the survey sites have small project teams working on self-contained projects with code reuse between projects. By comparison, only 7% of the sites feature large teams working on separate parts of larger projects with shared code and data definitions.

Large project teams are not in vogue, being used by less than 10% of the sites. But when these large teams are employed, they favor code reuse by greater than a two-to-one margin. Overall, small project teams are implementing 63% of the client/server program code and single developers are implementing 26 percent.

The most popular single strategy is the development of totally new applications with little or no reuse of legacy application, procedural or database code.

CLIENT/SERVER DEVELOPMENT OBSTACLES

What are some of the difficulties of developing and maintaining client/server applications? Figure 5 shows the responses to this question. Of the top five items, four concern training issues — network protocols, new development techniques, distributed system management and new methodologies.

This corroborates the response obtained when the survey inquired about the factors inhibiting the adoption of new development tools. Thirty-eight percent of the developers say there is "too much training required." There is a clear message here for developers: MIS needs to be realistic about the training issue, and needs to avoid aggressive deadlines on the first projects.

There is much more to client/server implementation than GUI interfaces. Even for information access applications in homogeneous environments with connections to desktop applications, the training needs to include at least networking software, network management, new programming languages and new application architectures.

Beyond these simple applications, there is much more to be learned. Thanks to the GUI tools now on the market, the interface may be the easiest part of the application.

System Availability

The generation of client/server applications is often being managed by the development organization, not the centralized data center. While system availability is at the bottom of the existing problems list, being mentioned at only 28% of the sites, only 31% of the applications surveyed are classified as mission-critical. As more mission-critical applications are implemented, availability will move up the list of cited problems.

Difficulties relating to new tool technologies are generally perceived to be less important than training issues. Three other issues — migration, responding to change requests and increasing code reuse — all can be at least partially addressed by shifting to more specification-driven cross-platform development tools. These tools, while not universally represented in the original site configurations, are among the most popularly adopted tools used specifically for client/server computing.

CLIENT/SERVER TOOL CONFIGURATIONS

According to survey respondents, there is no dominant language for client/server development. When asked to list all the principle programming languages used for development, developers are fairly evenly split among object-oriented languages (C++, Smalltalk or other), C, COBOL or a 4GL.

CASE, FORTRAN, PL/1, Pascal and Assembler are used at between 5% and 7% of the sites. A significant minority of respondents lists some other language in addition to these, including Basic, Paradox, RPG, dBase, Xbase, Visual Basic and FoxPro.

While some languages may be thought of as 4GLs by vendors, they are most often being used to customize interfaces and are not functioning as integrated development environments. The difference is that integrated development environments involve storing the entire application, both data and procedures, as meta data in a repository.

The fact that repository-based languages are used less frequently than mainstream languages for the average client/server project is explained by the large number of projects involving information access and desktop application integration. In addition, many of these applications are implemented at the departmental level with low cost tools.

CASE

Indeed, CASE tools are most frequently mentioned when respondents list their unfulfilled needs. The conclusion is that the relatively low adoption rate of CASE for client/server applications is not so much the result of organizational unwillingness to adopt as it is to a perception among users that CASE is still oriented toward mainframe host-based development.

This is no longer true. While CASE vendors have made enormous progress in the generation of native GUI code and transparent cross-environment targeting, it seems they still face a major communications challenge.

AUTOMATED TASKS

The survey asked about the overall percentage of sites using software tools for each of 16 application development tasks. These were listed in relative order of importance.

Only four tasks — interactive debugging, screen and navigation design, project management and GUI code generation — are automated at more than 50% of the sites. Interactive debugging is not only used most often, it is cited as the most important tool by the sites.

Automated testing, which would seem to be the next step in the quality process, is found in the bottom half of the list, at 11% of sites. Better testing and debugging is cited frequently by users as an unfulfilled need.

The need for debugging tools stems in part from the relatively low use of integrated 4GL and CASE tools which avoid errors in data flow, consistency, syntax and completeness by incorporating intelligence about the application meta data. The more advanced CASE tools, for example, include real-time feedback about consistency and data flow.

The limited use of highly integrated tools such as CASE or formal 4GLs also means that process management functions such as project management, version control and integrated debugging have to be provided via standalone tools.

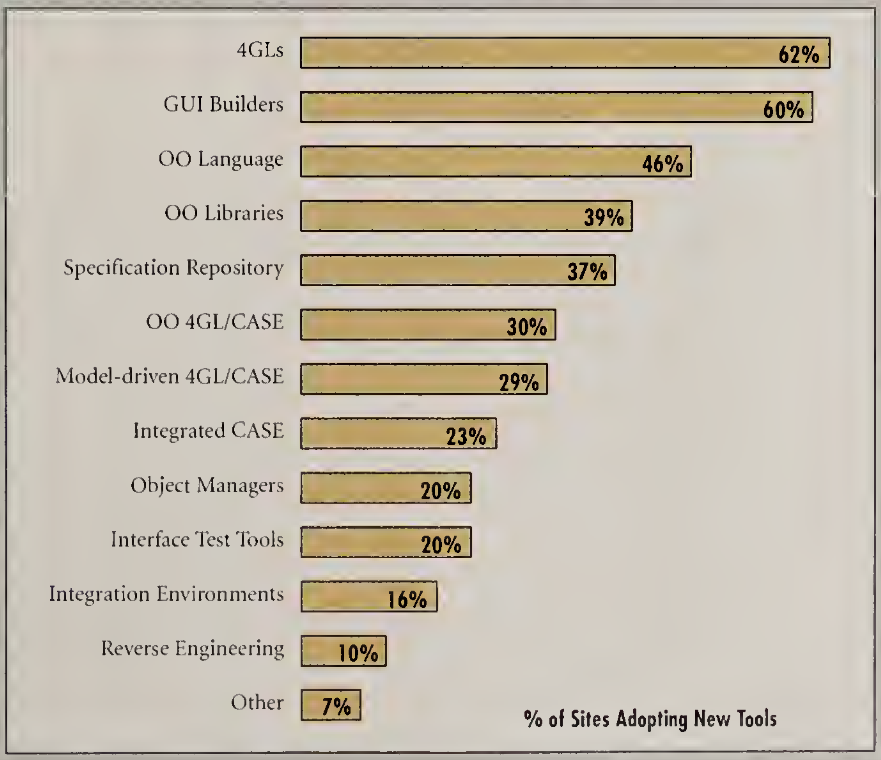
The problem with standalone tools is that they may lack the seamless integration necessary to make them truly effective. Integrated project management tools, for example, need to contain enough intelligence about the application so that they track the project automatically by watching the meta data in developer directories while noting status changes of modules as they transcend life-cycle stages.

CASE tools are most frequently mentioned when respondents list their unfulfilled needs.

Version control and configuration management tools may need to

ADOPTION OF NEW TOOLS FOR CLIENT/SERVER APPLICATION DEVELOPMENT

FIGURE 6



Source: International Data Corp.

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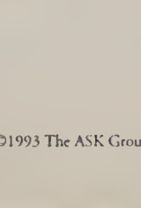

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track multiple applications and versions of tools that created them in order to provide comprehensive backup.

The virtue of integrated tools like CASE and most 4GLs is that version control is inherent in the application meta data definition and that the code can be recreated consistently from this specification. This eliminates the need for exhaustive environment tracking.

ADOPTION OF NEW TOOLS

Figure 6 shows the distribution of tools for those sites that claim to have purchased new tools specifically for client/server development. It is significant that 4GLs are

Blue Cross/Blue Shield of Florida: a CASE Study

Blue Cross/Blue Shield of Florida's first client/server computing effort is a correspondence application that dynamically writes letters, using data stored on the server in DB2, and tracks their status. Users see only an MS Word application. In this environment, all database accesses are transparent.

The previous method for handling correspondence used standalone PCs with manual information access and tracking control. Mike Quintero, BC/BS senior technical analyst, says that with the new client/server application, what used to take about two weeks can now be accomplished in three to four minutes. Moreover, he adds, the move from conventional to client/server development was relatively painless.

He attributes this to his organization's rigorous methodology, which is supported by Texas Instruments' Information Engineering Facility (IEF) CASE tool. BC/BS designed an overall system architecture as part of this application development effort. Separating client and server functions even when not designing a client/server application are important. This makes repackaging for client/server computing at a later date a straightforward process.

Application development began during August 1993 and took almost two months. The data model had been developed previously. The application is currently in pilot production with full production rollout with 50 clients on the LAN scheduled for February 1994. There has been some discussion about expanding usage via wide area communications, but there are no specific plans to move forward at this time.

The IEF had been used on several previous, non-client/server projects. According to Quintero, "If you have a rigorous methodology, and you are supported by strong, integrated tools, and you carefully segregate client and server functions, there is no great mystery to developing effective client/server applications. IEF permits building applications without writing any low-level C code. Developers just write pseudo code using a GUI interface." He has also found that the IEF is a good tool for generating applications that run on multiple platforms.

BC/BS has an established, well-defined process for all application development, not just client/server projects. All development uses the same repository, code generators and methodology. BC/BS has developed internal standards governing such areas as code reviews, quality audits, change management and testing.

Although BC/BS applications are built entirely by professional IS programmers, users are involved with the development team throughout the project. The organization's approach has not forced it to retrain conventional programmers since it uses the same tools and methodology for client/server and non-client/server projects.

BC/BS did train its people to split client and server functions. Also, generic templates were developed up front to insure consistent functions within and across applications. People were trained on how to use these templates.

The most significant difficulties encountered during this initial client/server project were independent of client/server technology. For instance, there was a network configuration problem which was corrected in about three days. Other problems involved management issues such as change control.

There were not any significant problems with middleware, since the IEF generates the code needed to run the application on the network.

What would Quintero like to see from vendors? "I wish they would provide better model management," he observes. "This should be integrated within tools. They need to address how to find reusable models to increase the amount of code reuse."

He advises others starting on the path to client/server computing to use an integrated tool set, and think strategically, not just tactically. "Define an architecture and stay with it. Develop and enforce standards. Pre-develop and use templates."

adopted for client/server computing twice as frequently as integrated CASE products. This is similar in proportion to the penetration of 4GLs vs. CASE in non-client/server situations.

Also significant is that three of the top six new tools are based on object-oriented methodologies. One of the more publicized promises of object orientation is the facilitation of code reuse. In particular, user interface designs, along with their inherent processing and variations, can be maintained in a much more efficient manner through the use of object-oriented tools that support inheritance and class libraries.

Another reason for emphasizing the use of 4GLs, CASE, object-oriented libraries and specification repositories is the utility of these tools in scale-up and maintenance. Reverse engineering tools are found at the bottom of the list in spite of the fact that about 20% of the sites claim to be using legacy databases and 17% claim to be migrating the entire application to client/server architectures. The application is redeveloped when accessing the existing database or porting the application code is not cost-effective.

Developers feel that tools should be able to work together in a reasonable fashion out of the box without on-site customization. However, they also feel that vendors still have some work to do in this area.

We suggest that developers starting out in client/server projects follow the lead of the pioneers and investigate specification-based 4GLs and CASE tools. If time permits, it would pay to learn about object-oriented development methodologies. However, within two years, most of the major 4GLs and CASE tools will incorporate many object-oriented features. These features will be easier to use and provide a more robust development environment than unintegrated languages such as C++.

Training

We are in the first generation of client/server applications. New users should start with non-mission-critical applications, since they can be rolled out progressively and serve as a test bed for developers. Start with fundamental features and add functional sophistication. The diversity of your application inventory will increase with time.

Retrain your developers for client/server computing. It is more cost effective than training a new developer in all of your business systems. This approach takes a serious commitment, but experience has shown that it works. Difficult issues that require extra attention include application architecture, event-driven logic and a sufficient understanding of the network environment to avoid snafus. When it comes to training, use a mentoring approach and spread the expertise around in small project teams.

Tool Productivity

Incompatibility with existing tool configurations is a primary inhibitor to productivity. If you can find integrated tools at a reasonable price, you will reap additional benefits in the form of reuse and more easily developed process management functions.

In the experimental stage, having rigorous control over the development process is less important than figuring out what the process is. As time goes on, however, there will be a need for management tools that address the development process. This need is reflected in comments from most of the survey respondents and feedback from all the detailed interviews.

High on the list of such management tools are version management, network monitoring, network performance tuning, library management and code testing. Sometimes there is a tendency to ignore process management when prototyping methodologies are used, since the ad hoc nature of the prototyping development paradigm tends to carry over to the overall project management. This mistake will haunt you.

Code reuse is presently limited by the lack of an ideal tool. Requirements for efficient code reuse include making sure that code versions can be tracked and maintained, and that all the tools are specification-based. Maintain the application at the logical level so logic can be reused. Beware, however, that logic is seldom desired in exactly the same form. Tweaking is necessary. This situation increases the need for object-oriented tools.

Interactive debugging is not only used most often, it is cited as the most important tool by users.

CONCLUSIONS AND RECOMMENDATIONS

Look for tools that are scalable. They must be able to access data on host/servers and on desktops. There will be a need to generate native client code and performance-oriented server code. Ideally, application modules should be automatically targeted to network devices.

Try to get pricing models from tool vendors that allow you to pay as you roll out your application to more and more users.

Involve users in the process from the first requirements all the way to detailed navigation. Remember, client/server computing means that the client is in control of the application.

Tools need to support rapid prototyping of the user interface. They also need to support both the deliberate and systematic design of the foundation database and the procedural logic that run as autonomous processes on the server.

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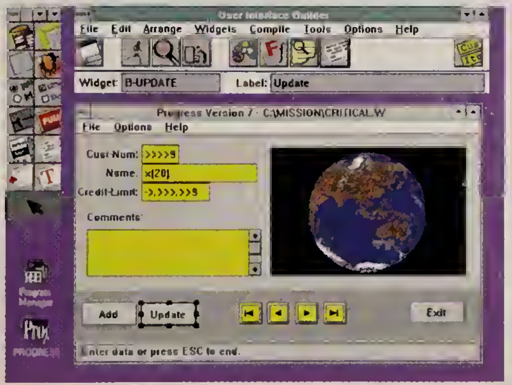
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forming computers from mere bean counters to productive aids. It is about making information part of the product, not just a tool for tracking products. Like all creative efforts, this will be a roller coaster ride even for the "pros" as they attempt distributed computing feats of daring. The good news is that there are many tools on the market that actually work. But there is not a single best choice. User challenges and environments are diverse, so technological approaches must target particular needs. Client/server computing is the next wave of computing architectures — and a wave you cannot afford to miss.

CITICORP Makes Quick Work of Unix Migration Project

CITICORP Mortgage Corp. decided to make a change in its information processing philosophy, so it migrated to client/server computing while staying with Unix. Code was ported from a traditional Unix environment to a client/server system with a Unix server and clients using Informix 4GL for Windows. Two client/server applications have been developed: credit risk analysis and a funding system.

This migration project was strictly a porting activity done by one person. There were no changes in function. The only changes involved differences in the Unix and Windows interfaces. The first application took one month to port, and the second, six weeks. Both have been in production for several months now.

Steve Skinner, CITICORP senior applications analyst, found client/server tools much easier to use than the old third-generation languages. "Visual C++ is light years ahead of C," he declares. "The quality of the tools really makes a major difference in the ease of application development."

The tools used were purchased expressly for client/server computing. The plan was to build up a suite of tools for the ongoing client/server computing challenge. Skinner's group evaluated a number of tools before choosing the Informix On-line Database Engine, Hypertools, Viewpoint Level 5 with Objects, Visual BASIC and the Microsoft Office Suite.

CITICORP has internal standards that apply to both conventional and client/server application development. Control and tracking is handled by SCCS on Unix. The group has also acquired a source control system which will be used on both Unix and Windows NT. Skinner says his people have encountered no particular methodological problems in moving from a conventional application architecture in Unix to a client/server architecture also based on Unix.

The problems encountered in development related less to the application code and more to management of physical infrastructure and network software. These problems included protocol stack issues, too little memory on clients, and problems with occasional crashes in MS Windows 3.1. Originally, the Informix On-line Database Engine and the network software supported incompatible protocol stacks.

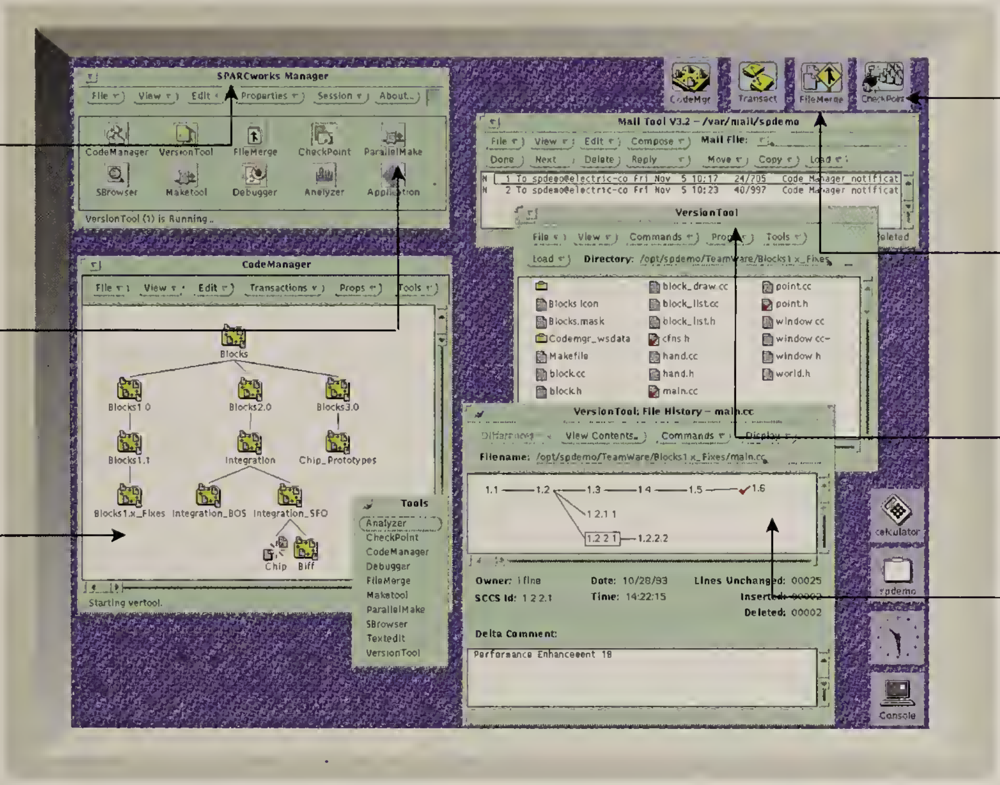
Users were intimately involved in this project, even doing the final testing. They used Viewpoint from Informix for information access. In the future, Skinner plans to have users use Viewpoint and Hypertools to generate custom reports and extract data. IS will continue to control database structure changes.

Skinner was trained at Informix. The training involved two three-day courses followed by weekly telephone meetings. Although his background is in Unix and mainframe programming, he did not experience any difficulties understanding the client/server application development. According to him, the most difficult area to learn is the network.

Skinner says vendors could make client/server computing easier. How? "Provide common interfaces between products. Proprietary interfaces to multiple databases can be very frustrating. There is no reason why OS/2 and NT shouldn't be able to work together." He further states that interoperability and standard interfaces are critical areas that should also be addressed by vendors.

"The tools are very good and getting better all the time. But you need to pay attention to network design and monitoring issues."

> *"The tools are very good and getting better all the time. But you need to pay attention to network design and monitoring issues."*
>
> STEVE SKINNER
> Senior Applications Analyst,
> CITICORP Mortgage Corp.



VersionTool (1) is Running...

```
N  1 To spdemo@electric-co Fri Nov  5 10:17   24/705   Code Manager notificat
N  2 To spdemo@electric-co Fri Nov  5 10:23   40/997   Code Manager notificat
```

Directory: /opt/spdemo/TeamWare/Blocks1.x_Fixes

Starting vertool.

Filename: /opt/spdemo/TeamWare/Blocks1.x_Fixes/main.cc

Owner: lfine
SCCS Id: 1.2.2.1
Date: 10/28/93
Time: 14:22:15
Lines Unchanged: 00025
Inserted: 00002
Deleted: 00002

Delta Comment:

```
Performance Enhancement 18
```

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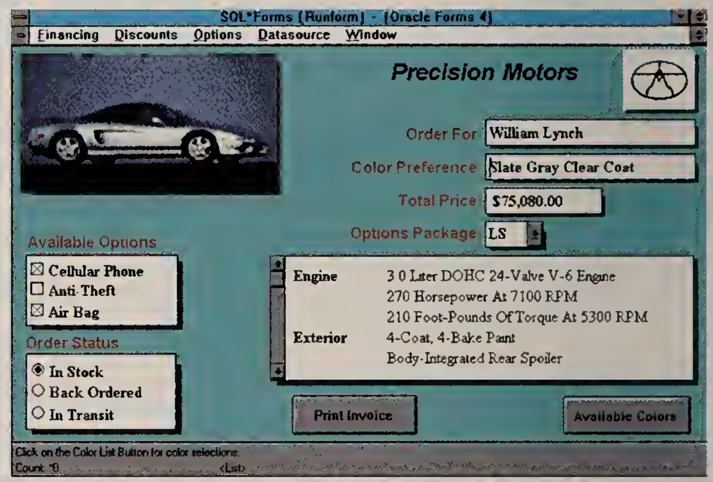

Order For: William Lynch
Color Preference: Slate Gray Clear Coat
Total Price: $75,080.00
Options Package: LS

Available Options
☒ Cellular Phone
☐ Anti-Theft
☒ Air Bag

Order Status
● In Stock
○ Back Ordered
○ In Transit

Engine	3 0 Liter DOHC 24-Valve V-6 Engine 270 Horsepower At 7100 RPM 210 Foot-Pounds Of Torque At 5300 RPM
Exterior	4-Coat, 4-Bake Paint Body-Integrated Rear Spoiler

Click on the Color List Button for color selections.
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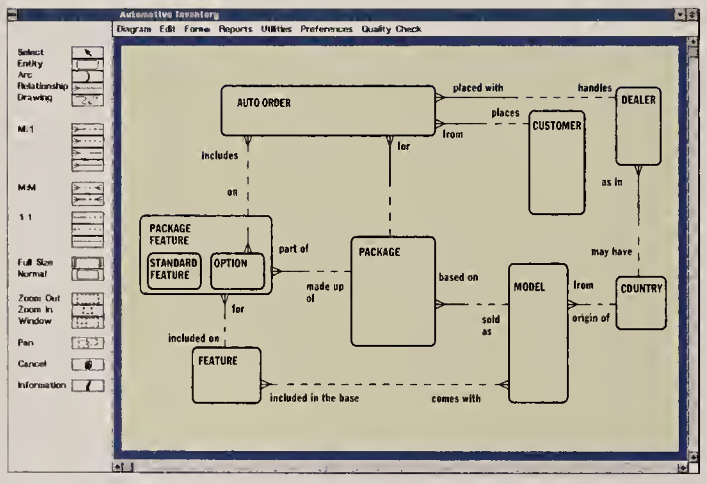
Oracle Forms

Oracle Designer



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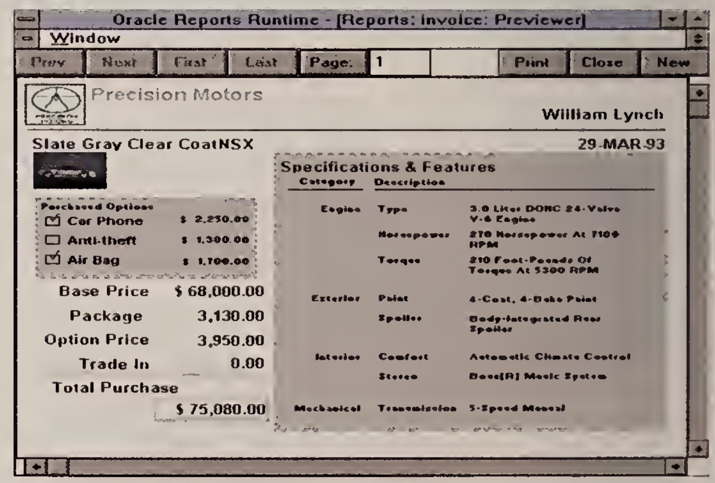

William Lynch

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Workgroup Computing

IBM opens utility to DOS, Windows, 75
New products, 75

Borland 'upsizes' the database ante

Latest release of Interbase targets users in expansion mode

By Kim S. Nash

Targeting the "upsizing" market, Borland International, Inc. recently outlined features of a long-awaited upgrade to its Interbase database, which is aimed at users looking to grow single- and limited-user applications.

In Interbase 4.0, the so-called upsizer can expect to see several features typically missing from other low-end databases, but the product lacks the industrial strength of a Unix-based relational database that can be found in offerings from Oracle Corp. or Sybase, Inc.

Further, Borland's having to keep on par with at least three database products is awkward, said Jeanette Sill-Holeman, president of Sill-Holeman Associates, Inc., a consulting firm in Woodside, Calif. Each product has to be continuously upgraded but clearly differentiated. "Borland does not do a good job of clearly spelling out why a customer would want to buy one database over another," she said.

New features in Interbase 4.0, which sources said has been in development for more than a year, include the following:

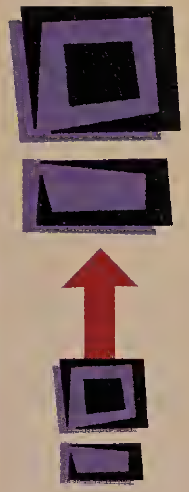
- ExpressLink, a driver that translates DOS and Windows commands to SQL. ExpressLink is based on Borland's IDAPI middleware.
- Scrolling cursors based on the server, rather than the PC front end, designed to let users glide backward and forward through data.
- Automatic updates and other changes to records, which can be performed at a PC in real time, rather than waiting for a server.
- Graphical tools that let users install and monitor Interbase 4.0 with point-and-click routines.

In general, Borland said Interbase 4.0's strength lies in both browsing and updating server-based data. "We can do [on-line transaction processing], but we are concentrating on upsizing," noted Betsy Burton, senior product manager.

Who needs it?

The product is aimed at the departmental user who has stretched the limits of a single-user application and database or someone who wants to expand a LAN, Burton said.

Scheduled for beta tests in March, versions of Interbase 4.0 for Novell, Inc.'s NetWare and Microsoft Corp.'s Windows NT are due to ship around midyear, Burton said. Prices are expected to be announced when the product ships.



One-step porting

Interbase users can port applications to the upgraded database without rewriting, Borland said.

Meanwhile, Borland is looking to form partnerships with systems vendors to bundle Interbase with other products. Such deals would be similar to a pact signed recently with The Santa Cruz Operation, Burton acknowledged.

A time frame for an IBM RS/6000 version of the improved product is more vague. IBM's Unix system "is key," Burton said, but she could not specify when Interbase 4.0 would be available on AIX. An OS/2 version is due out late this year, she added.

Overall, Borland's limited operating system support on its databases has stifled some users from moving to platforms that look more appealing, said Bob Kloninger, data processing manager at OK Industries, Inc. in Fort Smith, Ark.

For example, OK Industries chose Borland databases about three years ago, largely because the products included features not yet mature in some of the major large-scale relational databases, Kloninger said.

"Triggers, user-defined functions — we were happy to see those things in Borland at the

Borland, *page 75*

Imaging software

NordicTrack exercises work-flow control

By Michael Vizard

In the past three years, NordicTrack in Minneapolis has become a leading provider of physical exercise equipment by using an aggressive television and print advertising campaign. But while NordicTrack has brought more than 33 products to market in the last year, the company has no internal research and development department.

Instead, NordicTrack relies on independent inventors to submit proposals for new products. But keeping track of all of these submissions has proved to be somewhat of a challenge. To rectify this, the exercise equipment manufacturer has turned to Keyfile document imaging and work-flow software for Windows from Keyfile Corp. in Nashua, N.H.

Katherine Mahoney

"About 30 inventions go through a review process each day. We just couldn't keep up with that load using manual reviews," said Dave Janiszewski, manager of office automation.

That work load is driven by a NordicTrack commitment to review submissions in 10 days. "Usually it takes months, sometimes years, for inventors to get something evaluated. This can be pretty frustrating for them," said Wes Cutter, vice president of product planning.

By promising the quick, 10-day turnaround, Cutter said he hopes to attract a broader range of inventors to the NordicTrack stable. Working together, Cutter and Janiszewski have drawn up a flowchart describing how the review process should work to accomplish this goal.

"The important thing is not to think about how your process works, but what would be the optimum way to do it," Janiszewski said.

NordicTrack has deployed a five-user Keyfile license among its submission reviewers. When a proposal comes in, the text is scanned into the Keyfile system. Once installed, comments about that proposal, including patents, contracts and correspondence, can be routed among the group with a copy of the proposal.

Janiszewski said he plans to expand Keyfile use into other departments in the next three to six months. "We'd like to be able to route proposals directly to exercise trainers and physicians on staff and then directly up in engineering," Janiszewski said.

Da Vinci's mail gets boost from bundle

By Lynda Radosevich

Novell, Inc. partner Da Vinci Systems Corp. in Raleigh, N.C., said 600 of the top Novell resellers are using Da Vinci's electronic-mail client software bundled with Novell's Global Message Handling Service.

The bundle, called the Platinum Electronic Communications Systems, also includes Macintosh E-mail software from CE Software, Inc. and work-flow software from Reach Software Corp. The resellers are using the software combination to communicate amongst themselves as well as with Novell, according to Da Vinci.

Resellers are using the software combination to communicate amongst themselves and with Novell, according to Da Vinci.

Also, the resellers plan to offer the bundle to end users eventually. The combined offering is meant to help Novell, which does not offer its messaging applications, regain a footing in the corporate messaging marketplace before Microsoft Corp. and Lotus Development Corp. introduce their next-generation messaging products this year [CW, Dec. 13, 1993].

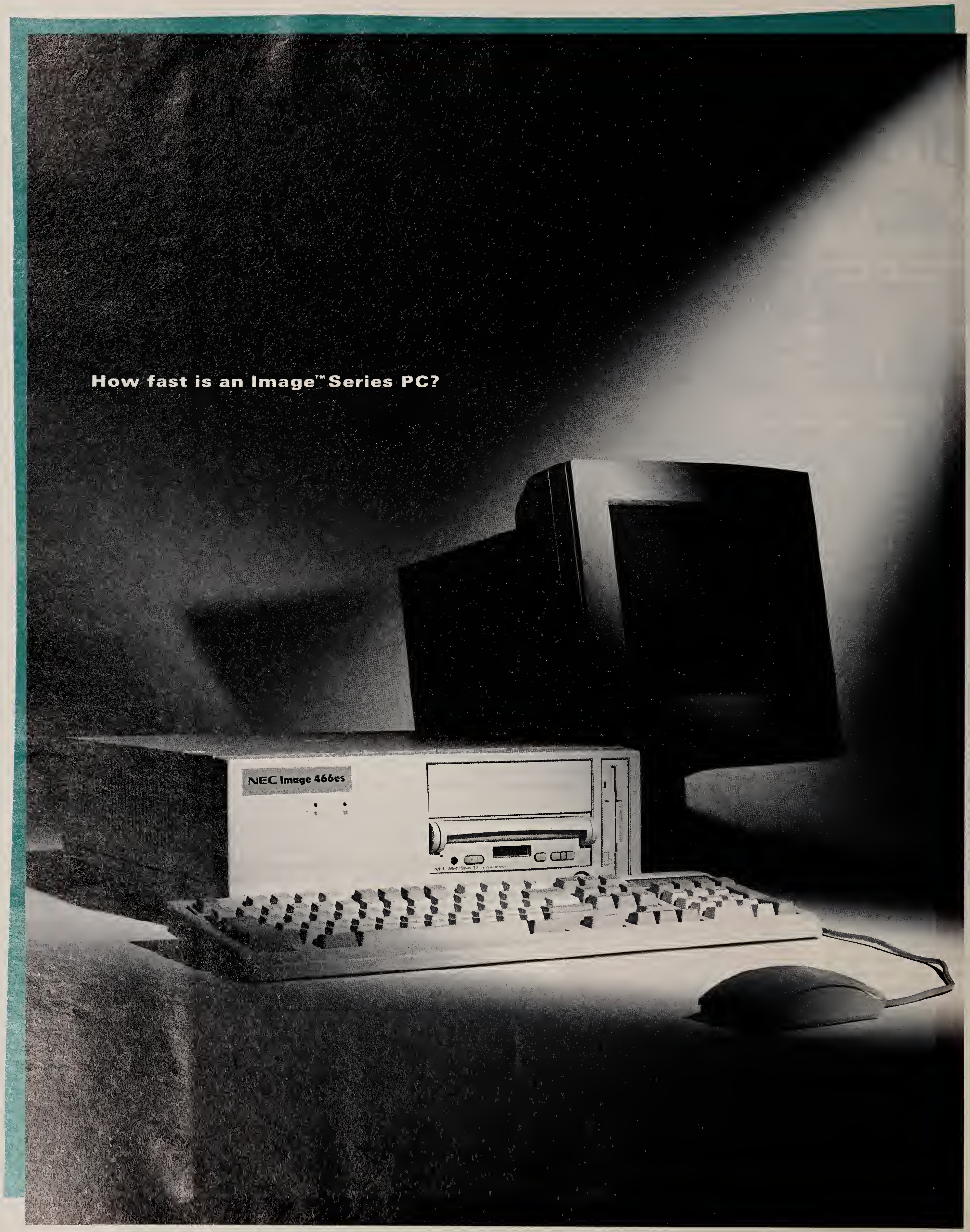
Enhanced Notework

Meanwhile, On Technology Corp. in Cambridge, Mass., announced it will ship an enhanced Windows version of its Notework E-mail software by mid-February.

The program, which now runs under DOS as a 5K-byte terminate-and-stay resident, will run on Windows as a fully compliant Windows program.

Notework 3.0 features include icons that launch various tasks and other Windows-style features such as scroll bars and cut-and-paste functionality.

It is client-only software that requires Novell NetWare and Message Handling Service running on the server. Pricing starts at $59 per user for a 10-user license, according to the company.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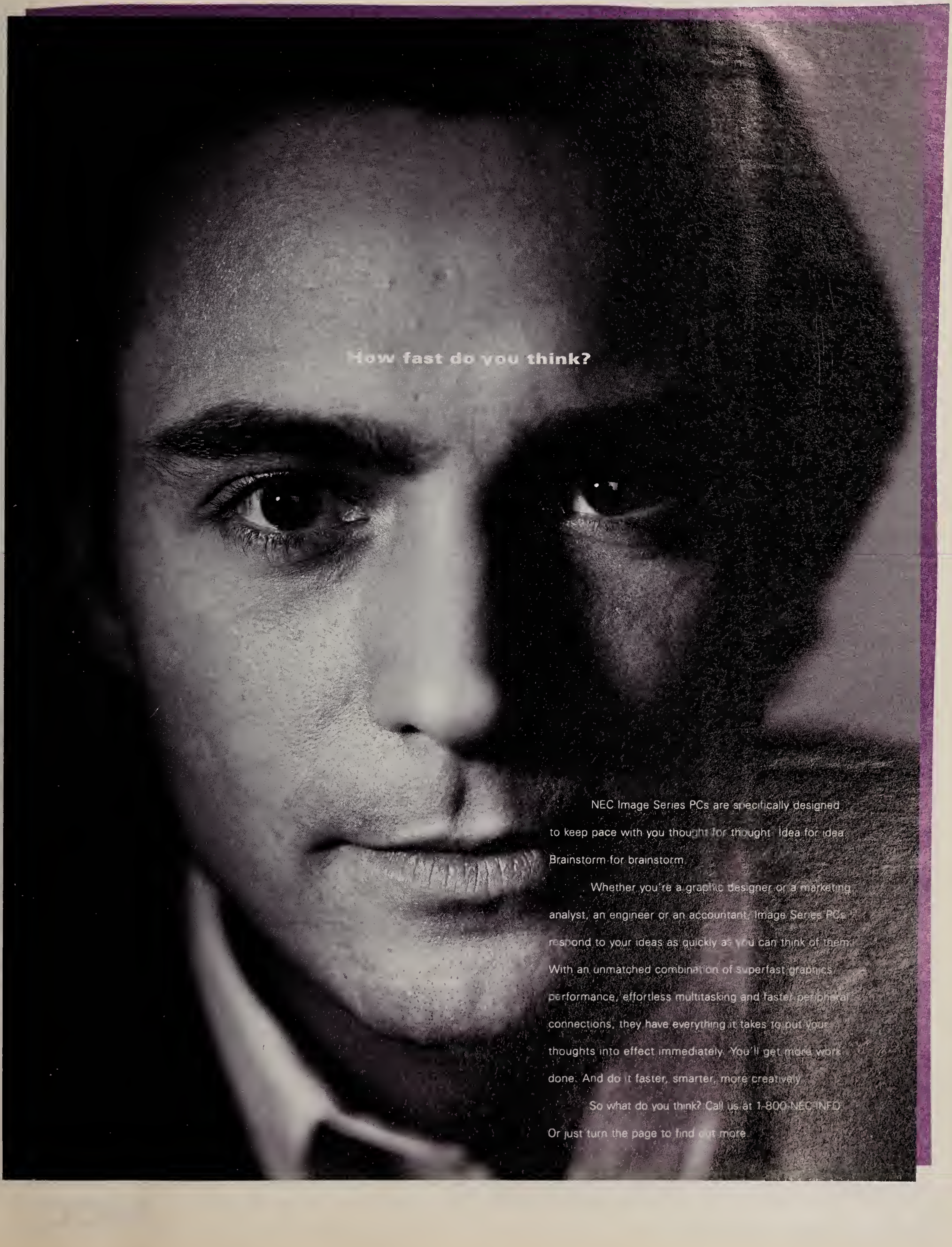
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NEC

Insurer adopts real-time database

By Michael Vizard

Looking for a way to enhance collaboration among its staff while easily complementing its existing investment in Windows, Syndicated Services has adopted a real-time bulletin board system from Team Software, Inc. in Houston.

Based in Chicago, Syndicated Services is a unit of Carvill America, Inc., which handles the administration involved in coordinating insurance policies for multiple insurers.

Supporting that effort is a Microsoft Corp. LAN Manager network that includes two Windows NT servers, a SQL Server database, Windows for Workgroups, Microsoft Mail and a number of word processing and spreadsheet applications.

Open for discussion

But none of these products provided a convenient platform for storing documents and related discussion around that data. To solve that problem, Syndicated Services has adopted the Channels bulletin board system that provides a real-time engine, giving users the equivalent of a chat utility on top of a discussion database.

"We needed a way to organize documents. Only one person on staff knew where all our stuff was," said information systems manager Ross Sponholtz.

Currently, the eight people in Sponholtz's organization simply attach documents to mail messages, which are then incorporated into a Channels database. In addition, Sponholtz noted that users can also employ macros in their applications to attach documents to the bulletin board system.

Syndicated Services establishes a forum in Channels for each individual insurance project, which can be screened from some users based on the security level Sponholtz puts on that particular forum.

In general, Sponholtz said Channels is easy to implement and manage and does a good job of shielding users from discussions that they are not interested in.

"People don't have to go through all the messages to find threads they are interested in," he said.

Sponholtz is currently having Carville's IS department evaluate Channels for use on a wide-area network.

CD-ROMs

Microsoft adds NT drivers

By Stuart J. Johnston

A recently released CD-ROM from Microsoft Corp. that contains more than 900 drivers lets users install Windows NT to work with a wide variety of devices.

Called the Microsoft Drivers and Patches CD, the disc includes drivers for accessing printers, storage devices, networks and video displays, as well as audio and pen systems.

It also includes patches for NT as well as code samples, utilities and articles, according to the company. "It's going to help reduce the cost of finding the right drivers for customers," said Rich Tong, Microsoft general manager for corporate and network systems, which includes Windows NT marketing.

The disc was the first CD released for Windows NT under the Microsoft TechNet program, a quarterly service offering that provides users with substantial volumes of additional support materials.

Annual subscriptions to the TechNet CD cost $295 for a single-user license or $695 for a single-server license that allows access by an unlimited number of users.

A subscription to TechNet also provides cumulative monthly CDs that contain Microsoft's Knowledgebase, its internal support database on the company's products, and Resource Kits for all of Microsoft's systems products. Also included are training materials and session notes from key Microsoft conferences, according to the company.

Software maintenance

IBM opens utility to DOS, Windows

By Ed Scannell

■ **Trying to ease the burden on users installing and maintaining software, IBM has made its configuration, installation and distribution (CID) utility compatible with DOS and Windows over both LANs and wide-area networks.**

The new enhancements support PC DOS 6.1, allowing information systems administrators to remotely install the operating system on PCs with or without DOS already installed.

IBM has also revamped the utility to work with its LAN Support Program 1.35, which now provides communication capabilities to access CID-enabled products residing on servers. This move is intended to help managers configure or install either DOS alone or DOS and Windows.

A third set of enhancements allow Version 2.0 of IBM's NetView Distribution Manager/2 to centrally manage and distribute CID-enabled products from a server for installation and configuration on workstations running either DOS or DOS and Windows.

What they wanted

For the most part, IS managers view the enhancements as the natural evolution they need to more efficiently service users in terms of time and money in client/server environments.

"Walking from machine to machine to install a product just isn't an option. CID offers a more economical solution to this sort of problem," said Shirley Eis, president of Software Corp. of America.

By CID-enabling PC DOS 6.1, IBM officials said they are confident that they can significantly boost sales of the operating system because of its ability to run on a wide range of IBM hardware. They also said they believe there is a growing need to install new versions of DOS in client/server environments.

"We really think this offering makes it easy for large accounts to upgrade their IBM and compatible systems to PC DOS over networks," said Sheryl Winton, DOS product manager at IBM's Personal Software Products group.

Safety net

The benefit of CID, unlike distribution methods such as replication, is that it eliminates the risk of wiping out user files or customized software. It ensures safety by running the installation program at the workstation itself, IBM officials explained.

First introduced in late 1992, CID is IBM's thrust to provide a software management system for distributed computing environments already running OS/2, DOS and Windows on client hardware.

PC DOS CID is available through the IBM PC Co.'s bulletin board at (919) 517-0001. LAN Support Program 1.35 and NetView Distribution Manager/2 are available through the IBM customer number at (800) 237-5511.

Borland

CONTINUED FROM PAGE 71

time," Kloninger said.

Since then, the company has put nearly all of its accounting systems on Interbase, running on Digital Equipment Corp. VAX minicomputers with Borland Paradox PC front ends.

OK Industries would like to shift from the VAXes to Digital's Alpha machines because "I have my back against the wall right now in terms of processor power," Kloninger said. But he cannot make the move because Borland does not support Digital's Alpha/OSF 1.

"I thought I wouldn't be buying any more VAXes, but now I have to ... because Interbase is a critical product for us," he explained.

New Products

Legler Systems Co. has announced Accounts Payable System Version 4.2.

According to the Orinda, Calif., company, the accounting module was designed for the IBM RS/6000 (AIX), PC-LAN and other hardware environments. Features include cash management, on-demand reporting with multiple record selection parameters and sort options and a pop-up help message window on any field on any screen.

An audit capability tracks user activity, measures system performance and identifies records that were deleted on-line.

Base prices for Accounts Payable System 4.2 start at $295 for two users.

▶ *Legler Systems*
(510) 254-1264

Avalan Technology, Inc. has announced Remotely Possible/LAN and Dial Version 4.0, remote-control communications software.

According to the Holliston, Mass., company, the product can be used for Windows and DOS remote control users.

Remotely Possible offers data transfer speeds up to 230,400 bit/sec. plus an advanced Data Encryption Standard encryption security feature.

The product supports more than 150 modems as well as asynchronous modem pooling. Support for PC dial-up connection and LAN connection is also provided.

Remotely Possible/Dial modem version costs $199. Remotely Possible/LAN network version for unlimited users at one site includes an integrated copy of the modem product and is available for $499.

▶ *Avalan Technology*
(508) 429-6482

KnowledgeNet has introduced Net/WrkVMS and Net/WrkHP, products that provide seamless integration among Digital Equipment Corp.'s VAX platforms running VMS and Hewlett-Packard Co.'s platforms running HP/Unix. The product also provides integration among VMS or HP/Unix platforms and IBM's AS/400-, OS/2-, RS/6000- or System/36-based platforms running KnowledgeNet's other Net/Wrk products.

According to the Palatine, Ill., company, the products operate across Advanced Program-to-Program Communications/Advanced Peer-to-Peer Networking and TCP/IP backbones using a simple command language.

Both products include a Net/Wrk Status Monitor for displaying current communications activity, plain English error messages for troubleshooting network failures, a communications history for reviewing the activities and connect times of any session and on-line help.

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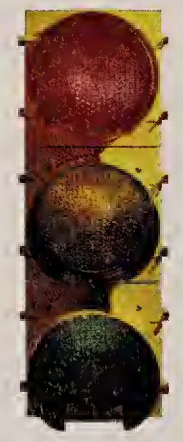

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Data encryption debate, 79
Help for business forms, 79

IBM users find alternate TCP/IP path

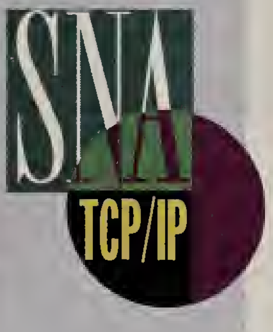
By Johanna Ambrosio

Mainframe shops needing to link their 3270 terminals to the brave new world of TCP/IP networks can get there from here.

New releases of software from Interlink Computer Sciences, Inc. in Fremont, Calif., are among the few offerings available to link the old and new worlds, analysts said. The other major player is IBM, they added.

Interlink claims that its wares offer performance gains over comparable IBM products, and at least one user said the Interlink solution is less expensive.

Bringing together legacy applications with the TCP/IP networking protocol is important to move computing forward. "We have a number of computing platforms here, and TCP/IP is the thing they all have in common," said Kenneth Gunther, manager of systems engineering at Estee Lauder Cos. in Melville, N.Y. "Now we can talk TCP/IP on the mainframe, too."



Piece of the pie

Out of approximately 17,000 MVS licenses, about one quarter will keep IBM's SNA as their only backbone network, Interlink said. The others will coexist with TCP/IP.

Gunther is looking into adding a PC-based terminal emulation package to Estee Lauder's approximately 550 desktop machines, he said. When that happens, the company will save an estimated $400 per PC because it will need only one network card per computer instead of the two now used.

"There's a lot of demand for connecting TCP/IP to IBM hosts," said Wayne Kernochan, director of commercial systems research at Aberdeen Group in Boston. "Interlink has found a sweet spot in the market."

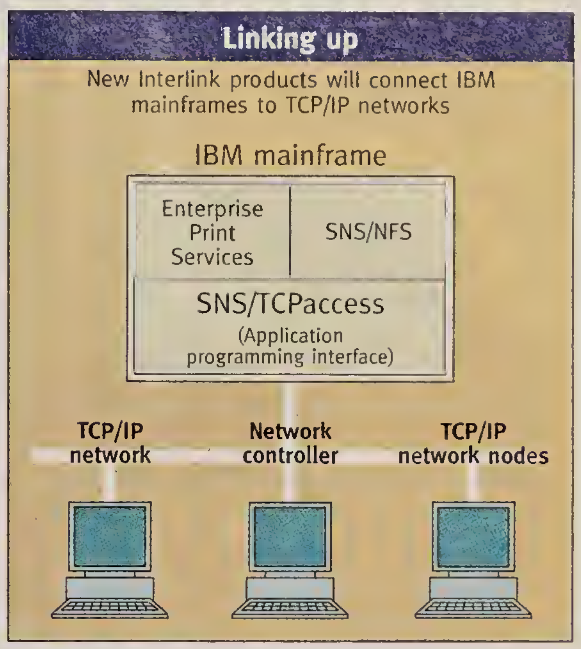
TCP/IP connection

Interlink's software, which runs on the mainframe, implements TCP/IP as a native facility under MVS. This means that hosts and network devices — including other computers hooked up to the network — can communicate on a "peer-to-peer" basis, the company said. The new wares include Version 2.0 of SNS/TCPaccess — the basic package that provides the fundamental communications services — as well as new versions of software that provides enterprise printing and file transfer.

The base product, SNS/TCPaccess, now features more efficient use of mainframe resources and runs twice as fast as the older version, said Charles Jepson, Interlink president and chief executive officer. The new release can also support more than 5,000 sessions from more than 5,000 host computers. Version 2.0 also sports simpler configuration and easier documentation, the company said.

Linking up

New Interlink products will connect IBM mainframes to TCP/IP networks



Similarly, Enterprise Print Services 2.0 has better performance and also now supports the LU3 protocol. For its part, SNS/NFS, Interlink's implementation of Sun Microsystems, Inc.'s Network File System (NFS), allows a mainframe to act as a file server to a LAN.

All three packages are available immediately. Prices range from $6,000 to $62,000, depending on the size of the host processor.

Government may put an end to GOSIP

By Gary H. Anthes

A recommendation that the federal government back away from its Government Open Systems Interconnect Profile (GOSIP) mandate has met with generally favorable response, and some said it has put one more nail in the coffin of Open Systems Interconnect (OSI).

GOSIP is essentially the government's version of the international standard OSI protocol suite. GOSIP compliance was mandated in 1992 for products the government purchases for data internetworking.

Now, a draft report by an interagency panel headed by Diane Fountaine, telecommunications director at the U.S. Department of Defense, said GOSIP has failed to live up to its expectations.

Market forces

"Most GOSIP products have been much slower to come to market than expected and have not been widely deployed to date, while the Internet Protocol Suite [IPS] standards have become commodity products that are widely used in LANs and private networks," wrote the nine-member Federal Internetworking Requirements Panel.

"More importantly, a substantial infrastructure, the worldwide Internet, has continued to develop, [and it] supports the IPS standards, while very little comparable infrastructure has been developed for GOSIP," the report added.

"The report is welcome news in Internet quarters," said Vinton Cerf, president of the Internet Society and senior vice president for data architecture at MCI Communications Corp. "Assuming the U.S. government sticks with these recommendations after the comment period expires, it seems that this pragmatic position will be helpful to other governments caught in the same trap."

Dan Lynch, chairman of Interop in Mountain View, Calif., called the report "great news" for users. "Now agencies can buy stuff from the market. The market was doing what they wanted to do anyway," he said.

Lynch conceded that GOSIP is useful in providing a checklist for purchasing officials. "But this opens up the list to the products that the marketplace is delivering."

Recommendations

In its draft report, which will be open for public comment until Feb. 18, the panel said, "The best overall approach for the federal government to achieve international interoperability is to rely on agencies to 'do the right thing' in their selection of mission-optimal choices."

Without being specific, the panel recommended that GOSIP be expanded in scope to include OSI, IPS and possibly other protocols, a concept that Cerf found troubling.

"The panel seems to espouse some kind of 'convergence' between the TCP/IP and OSI protocol suites," he said.

"The Internet community is more likely to take the view that if we generally end up with a single, common protocol suite, it should be for good, sound technical reasons and not to satisfy an arbitrary desire to achieve convergence by fiat."

The death of GOSIP, at least as it now exists, may not make much of a difference in agency purchases, some observers said. Even under the existing mandate, agencies can get purchasing waivers if they show that OSI-based products will not meet their needs or are much more costly than a TCP/IP-based alternative.

Buying habits

"Generally speaking, [GOSIP] did not stop anybody from procuring what they wanted," said Anastase Nakassis, acting division chief in the Network Architecture Division at the National Institute of Standards and Technology, for which the report was prepared.

The interagency panel said it was not able to recommend a single protocol suite for data internetworking. "Both the IPS and OSI have strengths and weaknesses, as do proprietary protocols," the panel noted.

But Lynch said TCP/IP will pull further ahead of the alternatives. "There is so much money on the table that people who are selling it are evolving it so that it serves additional needs," he said. "For example, tons of work is going on in the security area with TCP/IP."

Of OSI, Lynch said, "It is water under the bridge now for American users. The Europeans are still rallying behind OSI, but it is losing ground there as well."

Nakassis said the panel would issue a final report by early March.

What is GOSIP?

GOSIP is a federal information processing standard written by the National Institute of Standards and Technology based on data internetworking protocols developed by the International Standards Organization and the International Telecommunications Union.
GOSIP Version 1 became effective in August 1990; Version 2 became mandatory in October 1992.

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Security pros, Clinton clash over encryption standards

By James Daly

The firefight between the computer industry and the Clinton administration over data encryption policy is developing into a full-scale rebellion.

The administration's Clipper chip data encryption standard recently received a resounding thumbs-down from nearly 300 security and cryptography professionals attending a major data security conference, as well as from a cadre of companies that announced plans to adopt an industry encryption scheme and bypass the Clipper technology.

Hewlett-Packard Co. became the latest major computer maker to license an encryption methodology commercialized by RSA Data Security, Inc., saying it will integrate it into its HP 9000 Series 800 server. Unlike the administration's proposal, the RSA design does not provide an electronic trapdoor that would enable law-enforcement agencies to eavesdrop on electronic communications.

"Private industry realizes the need to verify that data has not been viewed or disturbed either en route or in storage," said Karl Klessig, president of Enterprise Solutions Ltd., an electronic-mail software provider and RSA licensee in Westlake Village, Calif.

Other RSA licensees include Apple Computer, Inc., IBM, Digital Equipment Corp., Sun Microsystems, Inc., Unisys Corp., National Semiconductor Corp., General Magic, Inc., a coalition of five cellular data companies and Bankers Trust Co., which announced a new RSA-based security package designed for financial industry client/server networks.

Clipper conflict

In April, the Clinton administration dropped a bomb on the world of computer security with the Clipper proposal.

In an effort to assist law-enforcement officers looking for a legal back door into coded criminal communication, officials from the National Institute of Standards and Technology and the National Security Agency said they intended to establish "key escrow," a voice and data encryption method, as a federal standard. This method would require that the technology needed to unlock a coded conversation be kept by government-approved agencies and retrieved in the event of government-approved wiretaps.

Data encryption would be done in silicon via a device called the "Clipper chip."

The proposal met with heated objections in the security community, whose members fear abuses by a technologically empowered Big Brother.

"Encrypting data means you want to keep it safe from everyone — no exceptions," said Steve Weiss, a vice president of technology and strategic planning at Bankers Trust during the three-day conference that RSA sponsored.

The conflict over Clipper is not the only area of contention concerning encryption. U.S. software companies building data encryption packages lose millions of dollars each year because of strict but outdated federal export control guidelines.

Tight control

At the root of the problem is a type of package that uses algorithms to scramble information, making it difficult for anyone other than authorized recipients to read.

The federal government puts strict control on the export of such packages, fearing they may prevent U.S. security agencies from intercepting foreign communications.

But a study by the Software Publisher's Association (SPA) in Washington said such encryption packages are flourishing overseas. In testimony before the Computer Systems Security and Privacy Advisory Board, the SPA's Douglas Miller said at least 215 foreign hardware and software products from manufacturers in at least 20 foreign countries now encrypt text, files and data.

Miller added that 84 of those products use the Data Encryption Standard (DES), an algorithm used by the federal government and believed to be unbreakable. While DES or DES-strength encryption is legal to own and use in the U.S., federal regulations prohibit its commercial export in most cases.

But there's a hitch: DES encryption software is available worldwide via the Internet, according to SPA general counsel Ilene Rosenthal.

"Current export regulations prevent the U.S. software industry from competing overseas, but they are not effective in preventing the export of DES encryption technology," Rosenthal said.

In prohibiting U.S. manufacturers from selling their encryption products in the global marketplace, the government is placing U.S. firms at a distinct competitive disadvantage, Rosenthal said.

Lee Mercer, corporate export manager at Digital, said the tight DES export controls are hurting business.

"We are going to be closed out of the [foreign] market, and we may lose sales of noncontrolled software and maybe even hardware and services because we can't provide the total package the customer wants," Mercer said.

Under fire

Until the Bush administration eased up certain export controls, a word processing program, which contained even a simple data encryption feature to keep personal correspondence private, may have been treated as ammunition under the Arms Export Control Act.

Forms management

System update speeds business forms orders

By Lynda Radosevich

Moore Advanced Services, a division of forms manufacturer Moore Business Forms in Lake Forest, Ill., has updated its forms management system, adding multiplatform support.

DocuMaster, priced between $50,000 and $250,000, was designed for large, forms-intensive organizations such as insurance, pharmaceutical and financial companies. It is a server-based enterprise partner to workgroup electronic forms packages.

The system lets companies store electronic master forms created using leading forms-design packages — such as those from Delrina Corp. and JetForm Corp. — in a central facility. Forms managers can then update and distribute the forms.

Major enhancements to the system are cross-platform support for the major network operating systems, database programs and desktop operating systems.

John Hancock Mutual Life Insurance Co. in Boston has used DocuMaster for six months, primarily to save on warehouse costs and to keep the forms from becoming obsolete, according to Joseph Spayne, a materials manager there.

"Ten percent of our inventory was obsolete at any given time, the experts tell me," Spayne said.

For example, a field office responsible for ordering dental forms would fill out a paper requisition for roughly 30,000 forms at a time, so John Hancock had to keep a large stock in warehouses. That stock could become outdated, Spayne said.

Now the field office places the order electronically in the DocuMaster system, which locates the nearest just-in-time printer and sends the most recent version of the forms to it for printing and delivery, Spayne said.

The system also provides management tools that were not available using a paper-based system, such as usage and cost reports, Spayne said. While he did not estimate the cost savings, Moore officials said that 30% to 50% savings in document, warehousing and updating costs are typical.

"Many companies have big problems with forms. They have thousands and thousands of different forms and there have been few, if any, products in the market to offer forms management," said Ron Bertrand, a program director at the electronic output strategies division of Gartner Group, Inc. in Stamford, Conn.

Set apart

Companies that develop forms-design packages are moving into the forms management market. But what differentiates Moore is its experience in the paper forms business, Bertrand said.

Additionally, the system is distinguished by its support for virtually all hardware and software platforms, according to Moore spokesmen.

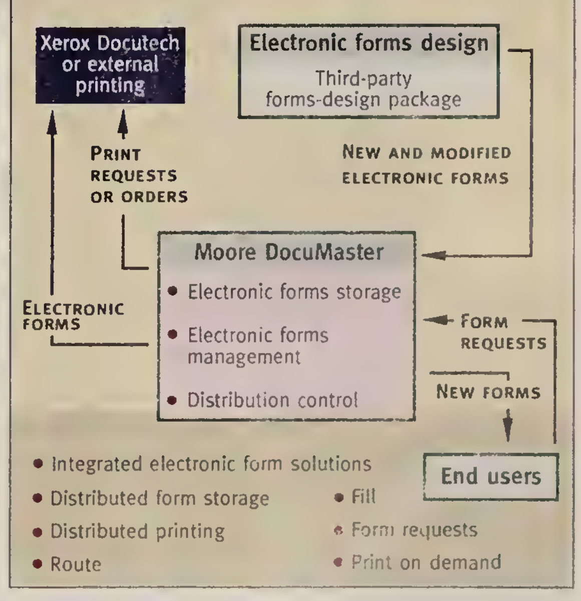
DocuMaster is composed of the following four components: Master server software stores, tracks and distributes forms to end users or printers; client software lets end users fill, print or order forms from a Windows-based PC; designer software lets a forms designer set up an object profile for a given form; and distributed forms server software stores form sets on a local server to minimize traffic on the network.

Moore also announced an agreement with Xerox Corp. to link Xerox's Docutech high-speed printer with the DocuMaster software on one network. The companies will jointly sell and support the combined systems.

Moore Business Forms sells roughly 10 billion paper forms per year, according to a company spokesman.

DocuMaster forms management

Moore's software is at the core of the forms process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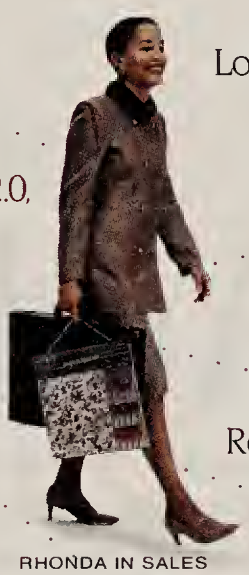

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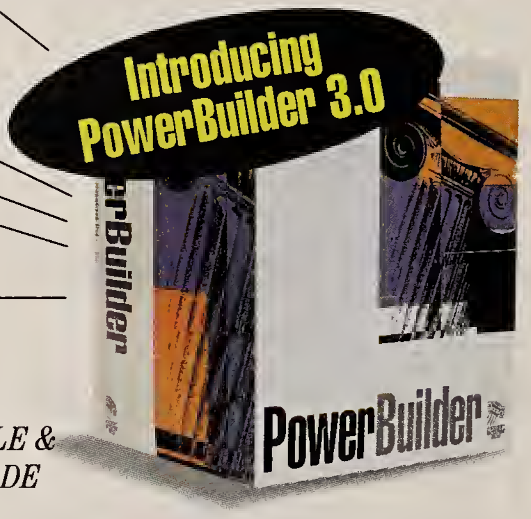

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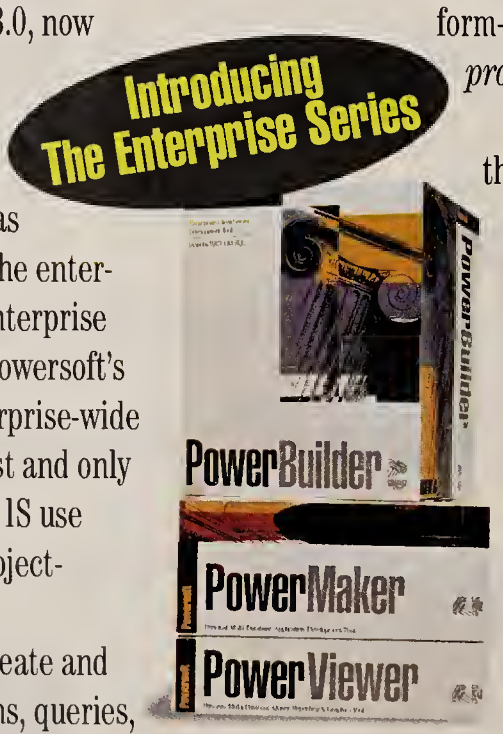

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Large Systems

EARTHQUAKE WATCHERS, 86
NEW PRODUCTS, 87

Simplot's modernization far from simple

By Craig Stedman
BOISE, IDAHO

Until recently, the systems that J. R. Simplot Co.'s food group used to track inventory at its five main warehouses were simple ones: large wallboards with maps of the facilities and colored magnets for noting the locations of different frozen potato and vegetable products.

J. R. Simplot Co. *warehouses were once technology-free zones*

Simplicity has its drawbacks, however. The warehouses were technology-free zones. Inventory records and order information for the $1 billion food business were kept on paper, requiring extra clerical staff and contributing to problems in shipping orders placed by customers that include McDonald's Corp., Burger King Corp. and KFC Corp.

Then there was the possibility that something could go awry with the magnets. For example, one time a warehouse visitor saw some magnets stuck to the board at angles and decided to straighten them out — blissfully unaware that the sideways placement indicated special product information.

Warehouses in need

With the food group accounting for half of Simplot's total annual sales of roughly $2 billion, the warehouses were an obvious first choice for modernizing when the diversified company embarked on a program in 1992 to shift its information systems from terminal-based Digital Equipment Corp. VAXclusters to a client/server architecture.

"That was the most pressing need," said Raymond Sasso, Simplot's chief information officer. The firm considered starting with something less important than its warehouses but decided against it, Sasso said. "The idea of picking irrelevant things so you can learn on your own may meet an IS agenda but not the company's agenda."

Doing its own software development, Simplot built "a basic vanilla warehouse system" using Digital Unix workstations, Sybase, Inc.'s SQL Server database and APT Workbench fourth-generation language, Sasso said. Extras such as optimum routing for order pickers were left for another time, but paper has been cut out of the process except for the bills of lading given to truckers, he noted.

The system was first installed in the fall of 1992 at the company's largest warehouse in Caldwell, Idaho, and is now running at two more Idaho facilities and one in Grand Forks, N.D. The last of the five warehouses, located in Hermiston, Ore., installed the system this month and should be operating it by mid-February, according to Simplot officials.

Cuts mean savings

The move away from paper enabled the company to eliminate nine of 138 jobs in Caldwell and to make smaller reductions at the other warehouses, resulting in "a considerable savings" on labor costs, said Stephen Gray, director of logistics for the food group.

While other savings are still "difficult to quantify," Simplot also expects to benefit from better inventory management, Gray said. Annual inventory turns at the Caldwell facility, which ships about 800 million pounds of food a year, have increased from 12 to 14 since the system was installed, he noted.

In addition, Simplot can now get by with lower inventory levels at a time when its product line is becoming much larger because of increased private-label sales and the proliferation of club stores. "The system forces us to be more disciplined," Gray said. "The information is very exacting now."

The required discipline allows for better quality control and is also helping to improve the company's accuracy rate in filling orders, Gray added. A September 1991 survey showed that only 78% of orders were being shipped exactly as customers had

J. R. Simplot, *page 86*

ON SITE

J. R. Simplot Co.
Boise, Idaho

Challenge: To shift frozen food warehouses away from inventory and order-filling system based on paper and magnetic boards.

Technology: Internally developed client/server system based on Digital Equipment Corp. workstations and Sybase, Inc. database.

Goal: To reduce staffing and inventory costs and improve performance in shipping orders to customer specifications.

Minicomputers

HP 3000 users see better performance

By Mark Halper

Users of Hewlett-Packard Co.'s HP 3000 minicomputer, who not long ago questioned the company's long-term commitment to the proprietary line, will get a few more reasons this week not to worry so much and will even receive some justification to add "client/server" to their lexicon.

HP plans to introduce today eight small- to midsized versions of the HP 3000 that offer improved price/performance over existing models. These versions also come with service price tags 40% below regular HP prices. The eight machines — two with two I/O slots and two with four I/O slots — use the new PA-7100 LC chip built into comparable Unix machines that HP introduced two weeks ago [CW, Jan. 24].

The PA-7100 LC's built-in features include multimedia capabilities, a floating-point controller and an I/O controller.

The lineup

HP added two versions for each of the four new models of low-end HP 3000 minicomputers

Model	Users	LX Price*	RX Price*
3000 918	8 users	$11,750	$15,750
3000 928	64 users	$39,000	$43,000
3000 968	100 users	$62,000	$66,000
3000 978	100 users	$81,000	$85,000

*LX designates two I/O slots; RX designates four I/O slots. HP is discontinuing two-slot versions of the 9x7 series.

Working into client/server

The hardware introductions coincide with HP's effort to position the 3000 as a machine that works well in a client/server environment even though its MPE/IX operating system is proprietary.

To that end, HP announced a slew of third-party software products that distribute processing between the 3000 server and desktop machines, including PCs.

The company also noted that two third-party vendors — Walker Richer & Quinn, Inc. and Unison Tymlabs, Inc. — either now or will soon offer terminal emulation products that permit Microsoft Corp.'s Window NT and Windows for Workgroups clients to access the 3000. Unison's product is available now, and Walker's is in beta testing, said Mark Hudson, HP product manager for desktop integration.

Together, these moves are intended to keep the proprietary HP 3000 alive not only as a stalwart on-line transaction processing system, but also as a server in an open systems world. Users noted that the software developments are propping up the 3000, which already has Unix hooks, as a viable option to full-blown Unix and open systems computing.

Worries are over

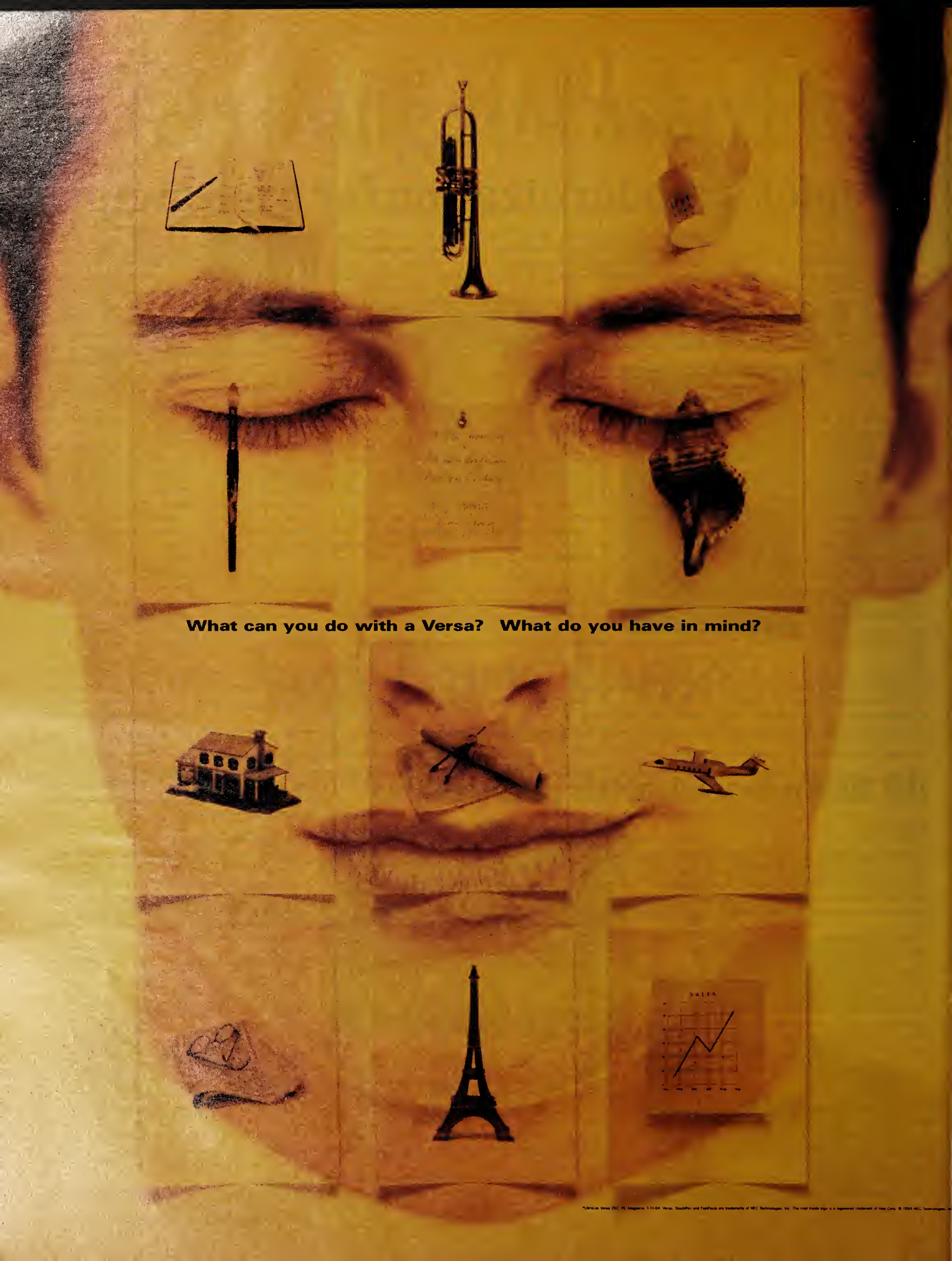
"There was a while there where people were worried that HP was giving up on MPE," noted Rodger Lindquist, manager of business systems development at Bio Rad Laboratories, Inc. in Hercules, Calif. "It's clear now they're getting close to having the Unix and MPE machines running the same software. They're converging to operate in the same area."

Ken Sletten, project engineer at the Naval Undersea Warfare Center in Keyport, Wash., lauded the emergence of Windows NT hooks and other client/server software. On a sobering note, however, he pointed out that "none of this is free. There is a cost in complexity."

John Jones, a San Francisco-based analyst at Salomon Brothers, Inc., noted that with connectivity to Windows and Windows NT, HP is joining an industry trend toward supporting multiple environments.

"IBM is trying to set up the AS/400 as the hub of a client/server architecture. One of the strong points of HP's 3000 family is robust database capability that plays into the server side of a client/server architecture," Jones said, alluding to HP's Image/SQL and Allbase databases.

HP 3000, *page 87*


What can you do with a Versa? What do you have in mind?

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NEC

Working toward a quake-proof design

Earthquake data collection and analysis could someday prevent Los Angeles-type disaster

By Ellis Booker

Not one supercomputer or workstation predicted the massive earthquake that rocked Southern California two weeks ago. Regrettably, an ability to predict quakes continues to elude science.

However, high-powered computers running sophisticated simulations are having an impact on the scientific understanding of earthquake phenomena and how best to design man-made structures to withstand earthquakes when they do hit.

Two power centers that conduct this kind of work are the Lawrence Livermore National Laboratory in Livermore, Calif., and the California Institute of Technology's Seismological Laboratory in Pasadena, Calif.

Monitoring the ground

Since 1990, Cal Tech and the U.S. Geological Survey (USGS) have been operating a network of delicate sensors throughout Southern California. The network, known as the Cal Tech USGS Broadcast of Earthquakes, or CUBE, comprises some 340 sensors in 250 locations, according to Steve Bryant, CUBE's director of technical support.

"When we get a quake, [the sensors] collect the location, size, depth and other data about its wave form," Bryant said.

Getting bigger all the time

Southern California's recent earthquake may cause researchers conducting computer simulations on the region's seismology to revise the value they assign to "maximum credible shaking." Experts note that the recent quake, which measured 6.6 on the Richter scale, saw "accelerations," or ground movements stronger than 1-G, the force of gravity. "Things were tossed into the air," said one researcher. Most earthquakes, he said, have accelerations that fall well under 1-G.

The sensors, called seismometers, connect back to Cal Tech over a variety of dedicated communications networks and plug into two Digital Equipment Corp. VAX computers. To help researchers see these results clearly, scientific visualization programs are run on Digital workstations.

While CUBE does not predict quakes, another application called Short Term Earthquake Probability, or STEP, uses quake data to assign probabilities for future quakes in the region.

For example, last week there was a 30% chance that another earthquake rating 6 or greater on the Richter scale would hit the area, according to Bryant.

AP/WIDE WORLD

Following the quake, bricks and debris surround *a building on Hollywood Boulevard in Los Angeles*

Buildings and bridges

Lawrence Livermore, meanwhile, is creating some of the world's most sophisticated models of the impact quakes have on man-made structures. What makes Livermore's work groundbreaking is its emphasis on a multidisciplinary computational model.

According to Francois Heuze, head of geotechnical programs at Lawrence Livermore, the laboratory's computer models not only analyze structural dynamics, but couple these to seismic and soil models in order to give an accurate picture of how the structure and its surrounding geography will be affected.

"What's most computationally taxing is [the study] of the interaction between the structure and its foundation," he said. A critical component is the impact of ground motion on soil, he said, since large quakes can actually liquefy soil during a quake, causing serious implications for the structures above. From a computer modeling perspective, this is a non-linear problem akin to fluid dynamics and therefore requires considerable computer horsepower.

In fact, Livermore uses supercomputers from Cray Research, Inc. in Eagan, Minn. Like Cal Tech, Livermore also uses workstations (but from Sun Microsystems, Inc.) for scientific visualization.

The lab also uses empirical quake data and hopes one day to create a valid computational method that will provide site-specific estimates for how structures such as a bridge or a building will respond to a large quake on a specific fault.

For the past three years, the laboratory has been working with the California Department of Transportation on the Computational Earthquake Initiative.

Early warning

Bryant suggested one novel use for existing earthquake sensor networks in Southern California: an early-warning system.

This would work because earthquake shock waves move through the earth's surface at between 6 Km/sec. and 3.5 Km/sec., which is far slower than the speed-of-light communication networks a sensor array uses.

"If we can locate the quake in 10 seconds, we could give someone 100 miles away maybe 50 seconds of warning," he said. "There's nothing technological today stopping us from doing that."

J. R. Simplot modernization

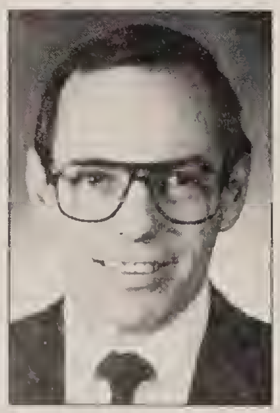
CONTINUED FROM PAGE 83

placed them; now the figure is up to 97%, due to the new system and some changes in operating procedures.

Getting workers comfortable with the system has been a problem, however. "We have people hired to drive a forklift, and now they're expected to go and run a computer of sorts," Gray said. "There can be a mental block against it. But we're growing with that, and it's a training thing. The tool is fine."

What it takes

Each warehouse system includes two R3000-based DECstations, one functioning as a SQL Server database server and the other as a client that runs the warehousing applications. Connected to the client system are a pair of Digital VT terminals for office personnel and multiple handheld radio frequency terminals that warehouse crews use to view and enter information about products and orders.


Raymond Sasso, *J. R. Simplot CIO: "The system is there, and it's successful"*

A SCSI switching mechanism allows the client DECstation to take on the database server role if that machine goes offline, said John Schutt, a Simplot engineer who helped design the warehouse system. The warehouses are all connected to the food group's order database at headquarters in Boise via a bridged Ethernet network running the TCP/IP transport, he added.

The design process was not completely smooth, Sasso acknowledged. Plans to use Intel Corp.-based systems running The Santa Cruz Operation's SCO Unix as clients were dropped during the pilot stage due to application reliability problems, and Digital has since de-emphasized both the DECstation line and its Ultrix derivative of Unix, making an upgrade path uncertain.

"I can candidly say that we didn't do as good a job as we could have because of the learning experience, but the system is there, and it's successful," Sasso said.

And Simplot is moving to the next step in its client/server program: redoing the food group's 150-person order-processing system, which is now run on terminals tied to a VAX.

However, the company "decided we didn't want to undertake the next one alone," Sasso added. It is looking for a software vendor with a ready-made ordering product and is talking closely with Pittsburgh-based GSI Transcomm, he said.

Hardware will be selected later in the process. Sasso said he hopes to start implementing the system in June and have it operational within a year.

Where they're going

Raymond Sasso, CIO at J. R. Simplot, said the full client/server transition is expected to take until the end of the decade to complete. "This is a very difficult technology for traditional IS people to work with," he noted. "You're not going to do it in two or three years."

Other areas that are scheduled to be addressed include financial systems, raw product procurement, manufacturing support, corporate logistics and sales and marketing, according to Sasso.

Simplot has been mainly a Digital shop until now but will be much more open-minded about hardware going forward, he indicated. "Part of the plan is to defer the [hardware] technology choice as long as we can," he said.

— *Craig Stedman*

New Products

BMC Software, Inc. has announced Version 3.3 of Reorg Plus for DB2.

According to the Houston company, the product increases DB2 data availability by performing DB2 database reorganizations up to 10 times faster than the DB2 Version 3 utility.

Enhancements for the product include an optional single-phase reorg and faster catalog access. This version sets copy-pending status where appropriate and uses recover-pending status during the reorganization.

The product also allows for the creation of new indexes during the execution of the reorganization.

Prices start at $16,000 for a perpetual license.

▶ *BMC Software*
(713) 918-8800

Storage Concepts, Inc. has introduced the Concept 810-SW series of real-time redundant array of inexpensive disks storage subsystems.

According to the Irvine, Calif., company, the subsystems provide 20M byte/sec. sustainable transfer rates with an upgrade path to rates as fast as 50M bytes.

The Concept 810 series offers up to 10G bytes of storage capacity. It was designed for applications that include teleradiology, pictorial archiving, digital X-ray and communications systems.

Pricing for the Concept 810-SW series begins at $16,800.

▶ *Storage Concepts*
(714) 852-8511

Murphy Software has announced Database for Quality (DBQ), a quality management software product for manufacturers.

According to the Southfield, Mich., company, DBQ is a multiuser relational database system that automates the quality-control process.

The product is able to organize quality information. It coordinates the entire quality effort, including record keeping, data collection, statistical process control, traceability, test certificates, statistical analysis, customized reporting and Pareto charting.

DBQ runs on IBM's AS/400 platform. Ten modules are available.

Pricing ranges from $10,000 to $100,000.

▶ *Murphy Software*
(810) 351-0900

Generic Software, Inc. has introduced Release 2.0 of The Spelling Assistant.

According to the Madison, Miss., company, the product allows IBM AS/400 users to find the correct spelling for more than 112,000 words and abbreviations.

Correctly spelled words and abbreviations are displayed in a pop-up window that can be accessed from within any application.

The Spelling Assistant 2.0 offers a spell-checking application programming interface that accepts a text string of up to 256 characters and will return the total number of misspelled words found, along with the first 10 misspellings.

The Spelling Assistant costs $299 per CPU for all AS/400 models.

▶ *Generic Software*
(601) 853-1189

Shape Electronics has introduced a line of stand-alone, on-line uninterruptible power supply (UPS) systems.

According to the Lombard, Ill., company, the systems use parallel on-line technology, a technique that allows two independent AC sources to keep the critical load on-line with 100% conditioned power, even if the UPS inverter fails.

After a power outage, Shape's system recharges in less than three hours.

Prices range from $3,920 for the 2.4kVA to $15,250 for the 18kVA.

▶ *Shape Electronics*
(708) 620-8394

Commentary

Ted Krum

Vendor (in)stability

Customers take note: Although most analysts now agree that the U.S. economy is on the rebound, this should not be taken as a guarantee that your computer systems vendor is on safe ground. Most large U.S. computer companies make most of their sales overseas, and this can still spell big trouble — as evidenced by Digital's recent surprise announcement of a 12.5% drop in revenue for the fourth quarter of 1993, compared with the previous year.

Digital is working through a difficult product transition, but half of the shortfall was due to especially poor results overseas. Standard & Poor's cited both of these issues in lowering its credit rating on Digital's debt.

U.S. systems vendors are now so heavily dependent on foreign markets that overseas conditions have to be considered in assessing their financial stability. The three largest U.S. vendors derive between 56% and 64% of their revenue from foreign sales. And right now, most overseas markets are struggling.

European recovery slow at best

The UK has just started to recover. Interest rates are falling and stocks are rising, but those developments are based mostly on anticipation of growth that has not yet materialized. Continental Europe is still mired in economic difficulties. Double-digit prime interest rates have not yet tamed inflation, and unemployment still ranges from 8% to 12%. Japan is facing its worst economic conditions in 20 years and has not yet hit bottom.

It's not surprising given those facts that in their latest fiscal years, nearly all vendors in foreign markets have had poorer revenue results than those in the U.S.

But the true picture is even worse than the depressing results recorded in annual reports.

Currency fluctuations can make a dismal situation look rosier than it is. Most foreign currencies strengthened against the greenback during 1992 and early 1993. This means that foreign profits, when brought back to the U.S., bought more dollars than they would have otherwise, artificially inflating the results shown in financial statements. All of Digital's revenue growth for the fiscal year ended June 30, 1993, was due to this phenomenon.

As the U.S. economy grows, vendors may seek to fuel customer optimism by discussing the recent cuts foreign governments have made to interest rates in an attempt to rescue their economies (as well as their political fortunes). Unfortunately, these stimuli will take a few quarters to start working. This will be the most painful period for U.S. exporters, including systems vendors, because the first effect will be a weakening of foreign currencies that will put U.S. products out of the reach of many foreign customers.

Skirting disaster

Vendors typically earn fatter profit margins overseas than in the U.S. Current circumstances, however, make them more likely to give heavy discounts and shift manufacturing overseas just to avoid disastrous U.S. dollar financial statements next year.

The silver lining in this predicament is that U.S. vendors have the opposite relationship with Japan. A stronger dollar means lower prices for imported chips, displays and circuit boards. Cheaper parts will help maintain margins in Europe and restore some of the profitability lost in U.S. price wars over the past two years. This opportunity will apply more to high-end systems vendors that retain some pricing discipline than to cutthroat PC vendors.

Although vendors operate in an increasingly complex global environment, U.S. customers do not typically get the information they need to evaluate their strength in this context. Annual reports can be difficult to interpret, and quarterly reports provide even less detail. Wall Street research and consulting firms focus on the U.S. marketplace because it represents the leading edge. To get a clearer picture, IS managers need to question vendor executives and collect views from observers based overseas.

Foreign industry or financial analysts may be difficult to contact, but large users may simply be able to talk to their counterparts in the international divisions of their own firms.

Krum is a senior research analyst at RCB International in Stamford, Conn. He can be reached by E-mail at Tedkrum@aol.com.

HP 3000

CONTINUED FROM PAGE 83

The eight new 9x8 servers replace the two-slot versions of HP's 9x7 series, and according to HP, provide up to 2.3 times the performance of their predecessors, with in-house estimated transaction-per-second ratings of 53 to 155.

The 9x8 series ranges in price from $11,750 to $85,000, depending on the number of users and system configuration. Those prices are comparable to prices for the predecessor 9x7 machines, but HP is reducing the price of service and support by 40%.

In addition, HP said the new machines carry significantly lower upgrade costs than predecessor models. To convert the new 9x8 LX from two slots to four costs $4,000. A similar upgrade on existing 9x7 models would cost over $10,000, HP said.

The new machines come standard with 32M bytes or 64M bytes of memory, depending on the model; 1G byte of storage; and a 2G-byte tape drive.

No change necessary

Jones observed that users across all brands have a need for lower-priced equipment. Unlike rival Digital Equipment Corp., which is asking users to switch hardware and operating systems, HP is attempting to keep costs down by not asking the user to change platforms.

"The customers, regardless of what they've got, have low-end requirements," Jones said. "What DEC is finding out right now is that to force the customer to go through a conversion to accomplish anything is probably an inappropriate strategy. HP is going to provide very competitive server products on whatever platform their customers want."

Although HP's Unix business is growing faster than its HP 3000 business, HP still stands to benefit from selling into a large 3000 installed base, Jones said.

More support all around

The new HP 3000's support higher-capacity internal disk and tape drives than their predecessor models. They also include enhanced uninterruptible power supply technology.

The next major release of MPE/IX, Version 5.0, will include support for Apple Computer, Inc.'s AppleTalk network, permitting the HP 3000 to act as an AppleShare server.

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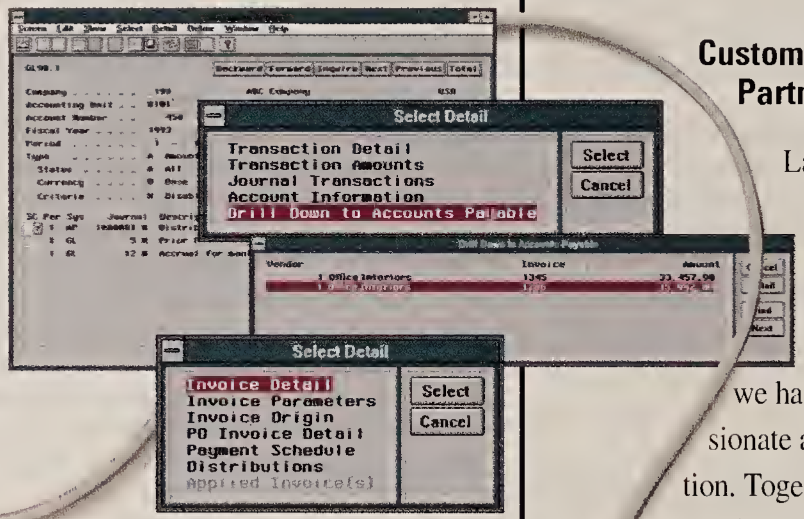

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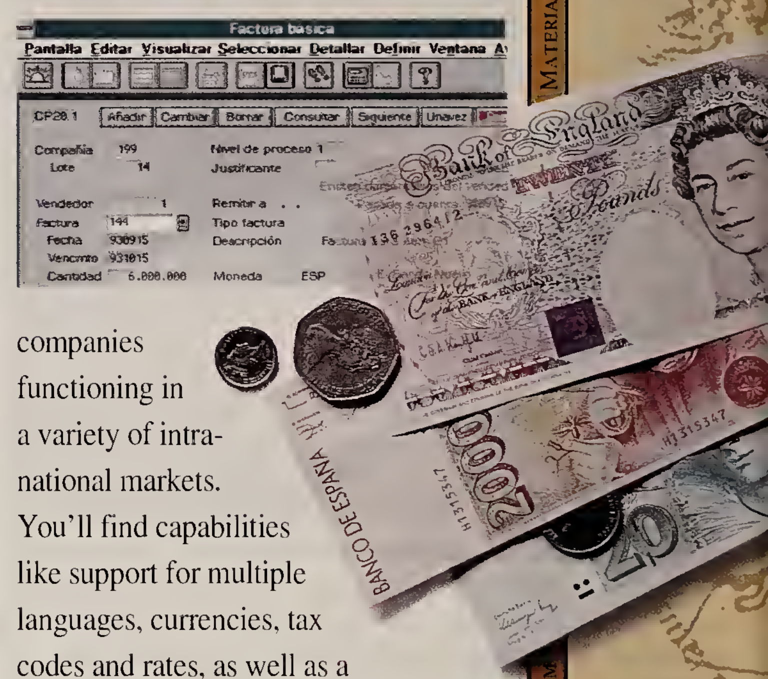

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Client/server tools market heats up

By Melinda-Carol Ballou

Borland International, Inc. is expected around midyear to announce technology aimed at deflecting Microsoft Corp.'s bid to establish Visual Basic as the standard for low-end client/server application development, according to internal and industry sources briefed by the company.

The expanded presence of Borland and others in this arena could help drive down prices for current midrange application development tools, analysts said.

Borland is expected late this year to deliver a set of application tools built on top of Object Pascal that will allow developers to construct applications similar to those associated with Visual Basic, the sources said.

However, Shep Bostin, product manager for Borland Office, said reports of such tools are "simply conjecture at this point."

The Borland tools will be able to drive Borland's Object Exchange facility, which Borland uses to seamlessly link its applications, the sources said. They added that the tools are likely to be compatible with a scripting language for all Borland applications that will support Microsoft's Object Linking and Embedding 2.0. That language is currently dubbed Object Automater.

"We've shown a common scripting language as proof of concept at Comdex, but the interfaces will be different from the actual product we ship. And we don't have a name for it yet," Bostin said.

The scripting language will be one of the main elements in Borland's effort to compete with Microsoft and Lotus Development Corp. in the suite market. For example, Lotus is pursuing a similar strategy with LotusScript, an object-oriented visual language based on Basic that Lotus will offer with its suite later this year.

Meanwhile, Borland's low-end client/server application push should further increase the pricing pressure on midrange tools that began with the advent of Visual Basic last year [CW, June 14, 1993]. Suppliers of midrange tools include Gupta Corp., KnowledgeWare, Inc. and Powersoft Corp.

Gupta and KnowledgeWare earlier this month announced new versions of their client/server tools.

KnowledgeWare's OpenView 3.0 offers tighter interfaces to Application Development Workbench (ADW); Personal SQL, a query and report-writing tool for easy access to SQL data; and WorkGroup Library, which offers concurrent real-time access to application components to facilitate easier reuse.

The new interfaces to ADW allow developers to take advantage of model-based design information, R&O, Inc.'s Rochade Repository for integration at the enterprise level and Boulder, Colo.-based Netwise, Inc.'s Transaccess middleware to integrate ObjectView applications directly with CICS and mainframe application databases.

Some analysts were optimistic about KnowledgeWare's attempt to use links to ADW to bolster the standing of its client/server tool for enterprise development, but they added that the competition is stiff.

The opposition

"They're trying to position themselves against Powersoft and Gupta by leveraging their experience in the [computer-aided software engineering] world," said Donald A. DePalma, an analyst at Forrester Research, Inc., a consulting firm in Cambridge, Mass. "But Powersoft and Gupta are beating the same drum from different angles. Most users will see this as the same technology with companies pushing a different agenda. And it's not so strategic that [users] wouldn't switch if something better came along for creating increasingly complex, mission-critical applications," he said.

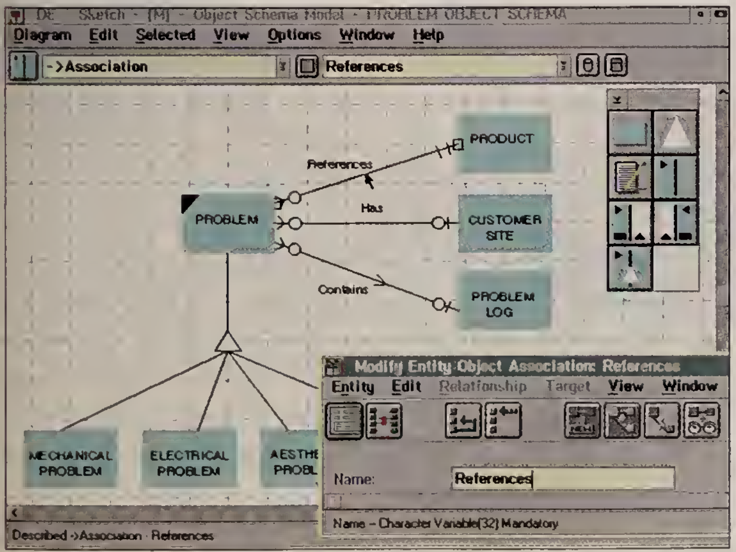
KnowledgeWare's ObjectView 3.0 will ship next month and is priced at $2,899; the price for WorkGroup Library is $699 per user.

Senior editor Michael Vizard contributed to this report.

Intersolv brings object-oriented design to Excelerator II tools

By Melinda-Carol Ballou

Intersolv, Inc. in Rockville, Md., unwrapped a package earlier this month for its Excelerator II tools that lets developers use object-oriented technology to create client/server applications. The package also locates design data in a centralized LAN-based repository so developers can access it using non-object-oriented methods as well, company officials said.



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Excelerator II *includes support for object-oriented design, allowing the creation of client/server applications*

Dubbed Object-Oriented Analysis and Design, the software includes support for object-oriented design methodologies and an object reuse model with an object browser.

For companies making the transition to object-oriented development, this flexibility of access can be a boon, according to industry analysts and developers.

"We're using the tool to explore the object-oriented paradigm," said Greg McDonald, a computer-aided software engineering (CASE) consultant at Home Savings Federal Savings Bank in Irwinville, Calif.

Tools help

McDonald and his staff said they do not think that object-oriented technology is ready to create industrial-strength applications, but the Intersolv tools are helping them prepare to adopt those techniques by supporting multiple methodologies.

Home Savings was an early-release site for the product. In addition to pilot development work, a number of people in McDonald's department are using the tool to complete homework for a course in

Intersolv, *page 91*

IBM to sell tool kit

Large client/server environments to benefit

By Ed Scannell

IBM has negotiated the rights to sell a Windows-based tool kit that helps developers create communications applications for large client/server environments.

Under the terms of the deal, IBM will sell Multi Soft, Inc.'s IMS Client Server Toolkit for Windows, which consists of a set of utilities and application generators, as IMS CS Toolkit.

The tool kit was designed to open up the mainframe world to popular PC development tools.

These tools are integrated with IBM's IMS OS/2 product to help developers create graphical front ends and applications that add client support to current IMS applications.

IBM's endgame is to help large shops with millions of dollars invested in IMS-based mainframes hand off costly processing responsibilities better handled by PCs and LANs. With some applications, existing mainframes have run almost twice as fast without further financial investment, Multi Soft officials said.

"Our software lets PCs do what they do best, which is all the front-end sorts of things like multiple edits," said Multi Soft Chairman Charles Lombardo. "And it lets mainframes do what they do best, things like security and database I/O."

Multi Soft's tools not only let developers refurbish character-based IMS applications with graphical front ends, but also have built-in software that can distribute software from hosts to workstations.

"By combining front ending and distribution, users have the ability to bring down lots of tables from mainframes [to workstations where they] can be more easily maintained," Lombardo said.

The IMS Client Server Toolkit offers developers an open architecture and middleware solution for accessing existing 3270-compatible systems using either a Win-OS/2 (the Windows capability in OS/2) or a Microsoft Corp. Windows tool that can work with a Dynamic Link Library.

More accessible

The IMS CS Toolkit was designed to open up the mainframe world to most popular PC and LAN development environments, including Visual Basic, SQL Windows, C++ and Visual C++. These languages can now be used with IMS Client Server to link directly to mainframe IMS applications.

The tool kit supports mainframe connectivity the same way across several Windows communications products such as IBM's Personal Communications for Windows, Wall Data, Inc.'s Rumba, and Digital Communications Associates, Inc.'s Irma Workstation for Windows.

Cognos increases range of PowerHouse 4GL

By Melinda-Carol Ballou

Cognos Corp. in Ottawa earlier this month announced PowerHouse Version 7.0, a new release of the company's fourth-generation language tools that offers support for SQL syntax, integration with several relational database management systems and control over transactions, according to Cognos officials.

The version targets users seeking to migrate proprietary minicomputer or mainframe applications to client/server environments, the officials said, and provides a stepping-stone to Cognos' Axiant graphical development environment [CW, Oct. 18, 1993].

Range increase a necessity

One PowerHouse user at Martin Marietta Corp.'s Aeronautics Division in Denver moved six years' worth of PowerHouse applications from a Digital Equipment Corp. VAXcluster system to Sun Microsystems, Inc. workstations.

"We went on-line in December, and it wasn't quite as easy as they say it will be — it took us four months," said Greg Miller, technical lead at the division. But the shift was made.

Miller requires support for a greater range of databases and platforms than what is currently available. Although Cognos is shipping PowerHouse 7.0 on Unix, Windows and DOS, for example, Miller's group has a large number of on-site high-end Macintoshes.

PowerHouse is also available for Sybase, Inc. and Borland International, Inc. Interbase RDBMSs, but Miller's group requires other RDBMSs such as those from Oracle Corp.

Cognos officials said support for those platforms and databases will be released in the summer.

Even as Miller's group considers downsizing its arsenal of tools, Miller said that Cognos' Axiant, with PowerHouse, remains a contender.

"The Axiant tool is very impressive," Miller said. "They showed us that you can join distributed databases within the PowerHouse reporting and query tool. Now we'll have to try it ourselves."

PowerHouse 7.0 is shipping now. Pricing for development licenses starts at $3,000.

Briefs

Integration plans

Trinzic Corp. and **Sybase, Inc.** announced an agreement to integrate Trinzic's InfoHub software into Sybase's OmniSQL Gateway software. This will enable direct SQL access to corporate data stored in nonrelational production systems. Together the products will let users read, update and join mainframe data sources directly.

Transarc awarded $3.9M

Transarc Corp. earlier this month announced that it has been awarded a $3.9 million contract by the Advanced Research Projects Agency of the U.S. Department of Defense. The goal of the contract is to find more advanced ways to locate information on the nation's information superhighway as it expands, company officials said.

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New Products

Visual Edge Software Ltd. and **Adobe Systems, Inc.** have introduced the Visual Action Toolset for Adobe's Display PostScript system, a software developer's kit for the Unix and Open Software Foundation/Motif environment.

According to Visual Edge in St. Laurent, Quebec, the product lets developers build next-generation applications that take advantage of the graphics provided by the Display PostScript system.

Users can access more than 13,000 Type 1 fonts from Adobe and other type vendors. The tool kit costs $2,500.

▶ *Visual Edge Software*
(514) 332-6430

Sapiens International Corp. has announced a family of rapid application development software products.

According to the Cary, N.C., company, Sapiens Ideo is an object-oriented tool that features a native SQL database management system engine and transparent access to Oracle Corp., Informix Corp., Sybase, Inc. and Digital Equipment Corp. Rdb databases.

PC development licenses range from $1,995 to $4,995. Runtime versions are available at no cost.

▶ *Sapiens International*
(919) 677-8711

Intersolv

CONTINUED FROM PAGE 89

object-oriented design.

Others praised Intersolv's support for a range of design methodologies and its model for reusing objects.

"I think that will be useful, and the object browser is also real nice because it lets us find [the objects] we need and then reuse them," said Ronald Chamness, business systems consultant at American Management Systems, Inc., a systems integrator in Arlington, Va., and beta tester for the product.

"When you can populate a repository so that rules and sharable objects will be completely available, users [will] start seeing the benefits from object-oriented CASE tools that they are desperately looking for," such as modularity and easier reuse of code, said Donald A. DePalma, an analyst at Forrester Research, Inc., a Cambridge, Mass., consulting firm.

The Object-Oriented Analysis and Design package includes the following features: a common design platform for mixing, matching and customizing methods; support for a range of methodologies, including Martin/Odell and Rumbaugh for more structured development; and Jacobson and Wirfs-Brock, which focuses on the behavior rather than the structure of data.

Also featured is an Advanced Reuse Model, which lets developers browse through an object library to locate the most appropriate objects for reuse in an application.

"Intersolv is moving away from CASE and focusing on client/server, and now almost all of our customers want us to get them positioned in the object-oriented world, which is what we're doing with this product," said Kevin Burns, Intersolv's president and chief executive officer.

Excelerator II for Client/Server including the Object-Oriented Analysis and Design package is available now for $5,000 to new customers; an upgrade is priced at $1,000 for current Excelerator users.

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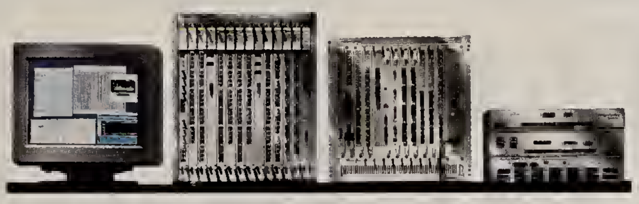

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Management

Today's powerful retailers are demanding more and more of their suppliers. First it was EDI and bar codes. Now they're threatening . . .

MANAGE MY INVENTORY OR ELSE!

BY MITCH BETTS

Remember getting those shocking "letter bombs" from mega-retailers in the 1980s? They demanded that suppliers adopt whatever electronic data interchange (EDI) and bar-code formats the retailer wanted — or else face business extinction.

Well, they're ticking again. Call it "Letter Bombs, Round 2." Now those ever-demanding "power retailers" also want suppliers to take on responsibility for managing the retail inventories of their products, a notion called "vendor-managed inventory."

The concept seems simple enough: The supplier gets point-of-sale (POS) or warehouse data from the retailer and uses that data to make inventory replenishment decisions. The supplier either dials into the retailer's system to take a peek at the product flow or gets sales and stock data in an EDI message.

Why would retailers essentially outsource such a critical function? The theory is that the manufacturers are the product or "category" experts and therefore can do the best job of making sure supply meets demand. (Skeptics say the retailers are closer to the consumer so they could do a better job.)

PAUL SHULENBURG

The trend is so new — much activity will begin this year — that it remains to be seen whether this dramatic role reversal will have any real benefits or will just dump another costly burden on suppliers.

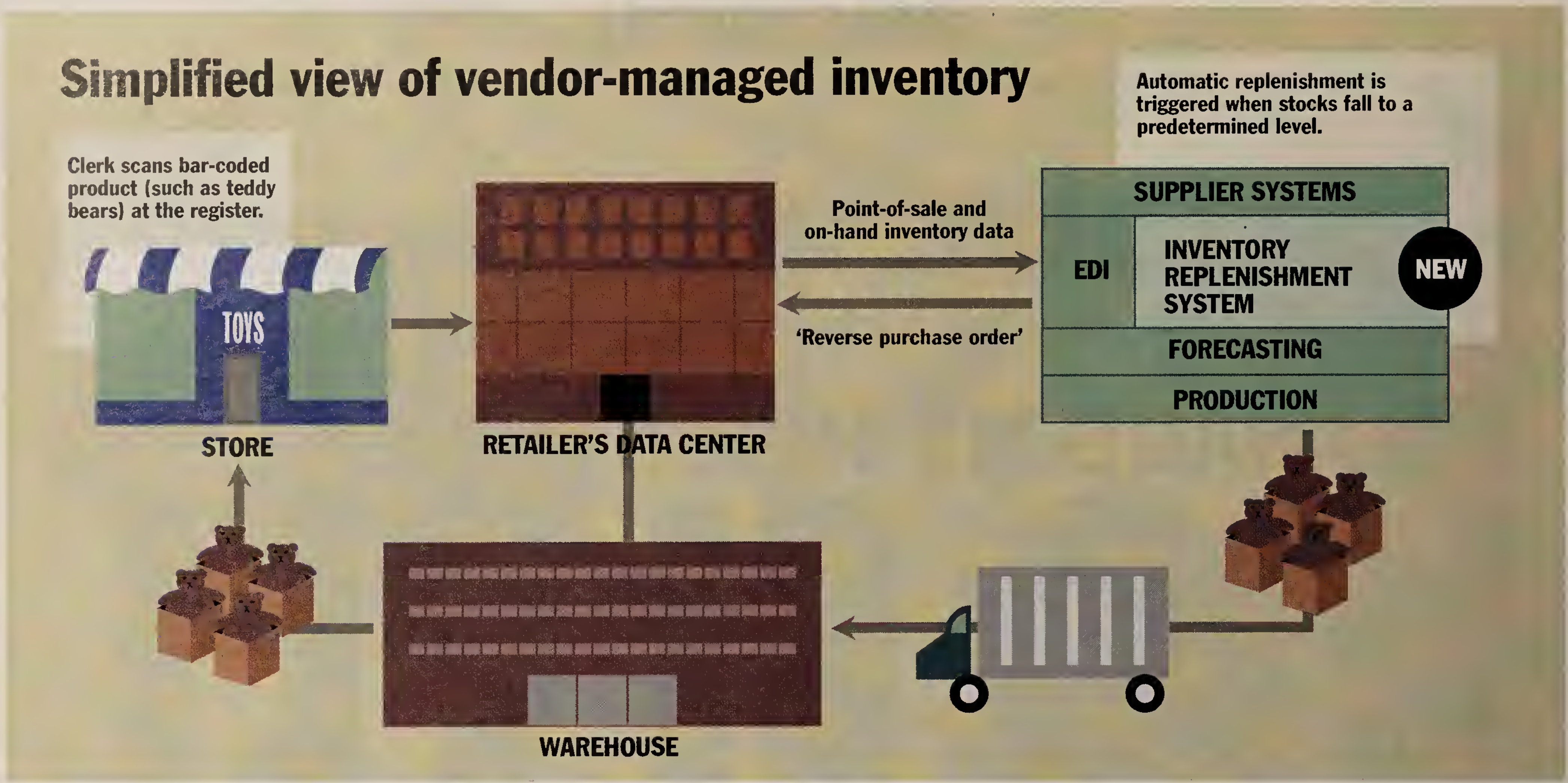
Nevertheless, the information systems units at such suppliers as RJR Nabisco, Inc. and Totes, Inc. are scrambling to build the required systems and are swallowing the costs. They have no choice if they want to see their products on the shelves of America's biggest stores.

The technical challenges are considerable.

Inventory, *page 94*

inside:

IS has a big role to play when companies choose locations for call centers. Page 96



Simplified view of vendor-managed inventory

Clerk scans bar-coded product (such as teddy bears) at the register.
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EDI
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WAREHOUSE

Inventory

CONTINUED FROM PAGE 93

Vendor-managed inventory requires building systems that collect data from the customer and feed it into the manufacturer's forecasting and production systems, says Joseph C. Andraski, vice president for integrated logistics at the Nabisco Food Group in Parsippany, N.J.

Nabisco has a half-dozen customers that require vendor-managed inventory, Andraski says. But each has different needs, so each inventory system has to be customized, or "hard-wired," for that customer. Naturally, Andraski has become a big advocate of standardization.

Not business as usual

Aside from the challenge of building front-end systems to handle the specific requests of each retailer, IS managers universally are finding that this new world of vendor-managed inventory also requires a new way of looking at their business.

"Just a few short years ago, it was 'put the product on the truck and then forget it.' Now we have to pay attention to consumer buying habits . . . and we have to think much more like business people to change the whole business process," says Donald Lacher, MIS director at Totes, the rain gear maker in Loveland, Ohio.

Totes is now "in discussions" about vendor-managed inventory with Braintree, Mass.-based Bradlees, Inc. department stores, Lacher says. Similarly, Leviton Manufacturing Co. in Little Neck, N.Y., which makes electrical devices, is developing a vendor-managed inventory system for dealing with Ace Hardware Corp., Home Depot, Inc. and Wal-Mart Stores, Inc. in the first quarter of 1994.

For suppliers who do get the call to manage a retailer's stocks, this sudden shift in responsibility and risk is 'like jumping into a cold pool early in the morning,' observes Robert Salerno, partner in charge of the retail consulting practice at Coopers & Lybrand in New York.

Tom Parisi, business systems specialist at Leviton, says the first step is to start thinking like a retailer.

"We have to change hats, make believe we are Ace Hardware and process data that's not ours," Parisi says.

Self-service

Not all giant retailers are turning to vendor-managed inventory. Some have sophisticated inventory management systems and figure they can do a better job themselves.

Dallas-based JC Penney Co., for example, has dabbled with some pilot programs but generally prefers to rely on its own long experience in inventory management and its award-winning inventory replenishment system, according to EDI manager William Lane.

For suppliers that do get the call to manage a retailer's stock, this sudden shift in responsibility and risk is "like jumping into a cold pool early in the morning," observes Robert Salerno, partner in charge of the retail consulting practice at Coopers & Lybrand in New York.

"Now you've got to worry about the customer activity at a particular store, whether the stuff is on promotion and whether sales are being hurt by road construction in front of Store 23," Salerno says. "You may have 1,800 stores to worry about, and you don't have the organizational structure or culture in place to be able to do that."

Paper avalanche

IS managers say they can cope with a handful of demands for vendor-managed inventory, but what happens if they get dozens of inventory letter bombs?

"Some manufacturers have already told me that they're doing vendor-managed inventory with six customers, and they can't handle any more," says one in-

customer-managed inventory?

Vendors are already looking beyond vendor-managed inventory

The trend now is toward vendor-managed inventory, but that may be just a transition phase to a more sophisticated form of customer-managed inventory at the store level, according to Andre Martin, chief executive officer of LogicNet, a division of Information Resources, Inc.

LogicNet provides software for inventory replenishment programs, as well as point-of-sale data from Information Resources' vast databases. Martin says LogicNet can handle inventory replenishment tasks regardless of whether the retailer or the supplier is doing the managing.

But Martin says he believes that, fundamentally, the individual store is the "central nervous system" of the whole supply chain, and that is where the control should be.

"Who knows best what the consumer really wants? It is the one who is closest to the firing line, the people in the stores. The further away you get from the store operations, the less chance you have of forecasting what the consumer really wants," Martin says.

For some time, there will be a hodgepodge of both vendor- and customer-managed replenishment systems across the nation, Martin predicts.

Software competitors in this market include Manugistics, Inc. in Rockville, Md., and IBM, whose Inforem III inventory replenishment program was originally developed by Procter & Gamble Co.

—Mitch Betts

dustry observer.

Because the cost of adding IS professionals to build more and more inventory linkups could become prohibitive, suppliers may decide they can afford to accommodate only their biggest customers and decline the rest, experts say.

If the costs become excessive, then corporate executives will have to draw a line, says Ivars "Ike" Eichvalds, IS director at Scotch Maid, Inc., a New York-based supplier of women's exercise clothing with $70 million in revenue.

Scotch Maid is writing custom software for its IBM AS/400 to comply with retailers' requests and will add more disk capacity to handle sales data from thousands of stores.

Meanwhile, Eichvalds will be looking to see if any software vendors come up with a package that is flexible enough to handle the various demands of its retailers.

The biggest concern is that some retailers cannot provide good sales forecast data on which to base inventory decisions, Eichvalds says.

How it should work

Although some retailers can provide data summarizing sales trends as part of their EDI transactions, others cannot. Retailers also charge a fee if the supplier wants high-volume streams of detailed, store-level data rather than summary data. Another option is to buy syndicated POS data collected by firms such as Information Resources, Inc. in Chicago (see story page 94).

Ideally, vendor-managed inventory gives suppliers new insights into the demand for their products, which should then drive what and how much is manufactured. If that happens, vendor-managed inventory is a win-win situation, says Claire Parker, a vice president at CSC/Cleveland Consulting Associates.

However, Parker hastens to add, if the scheme does not change the production process or squeeze out excess costs and inventory, then vendor-managed inventory has really just shifted costs to the vendor.

The penalty box

Meanwhile, the letter bombs with new requirements for EDI and bar-code labeling continue to stream in, with deadlines as short as six weeks for compliance and nasty financial penalties for paper transactions or unreadable bar codes.

When it comes to financial penalties for noncompliance, "some of these companies can be real nasty," says Parisi, who has been a letter bomb recipient.

For example, the penalty for the first violation may be a 10% cut in the payment for that order. The second violation means a 50% cut, and the third violation means "say good-bye," Parisi says.

Similarly, Ralph's Grocery Co. in Los Angeles levies fines for unreadable bar codes: The first violation nets a warning, the second results in a $500 fine, and subsequent offenses cost $1,000 each.

To be fair, most bomb-throwers soften the blow by providing extensive technical assistance to get small trading partners on board, and PC-based software kits have made the job more affordable.

An offer you can't refuse

Power retailers may even couch their letter bomb in terms that make it all sound voluntary. But it is about as optional as the voluntary tax compliance system of the Internal Revenue Service, Salerno says. You can comply with the requests of the retailing kings, he says, or "you have the option of not selling to them."

Although suppliers privately grumble about these "bullying" tactics — which seem incompatible with industry rhetoric about retailer/supplier "partnerships" — the brutal truth is that the mega-retailers have the leverage because they are the channel to millions of bargain-hunting consumers.

Despite talk about data sharing, integration and partnerships, retailers and suppliers can get only so close. After all, the basic rules of capitalism call for arm's-length transactions between buyers and sellers, which implies some adversarial tension.

"Realistically," says consultant Parker, "we're not likely to get to a point in the next 10 years where it's one big, happy, sharing family."

Betts is *Computerworld*'s national correspondent in Washington.

The price for noncompliance

Suppliers that violate the inventory demands of retailers may face severe punishment. The penalties can be as follows:

OFFENSE	PENALTY
FIRST STRIKE	10% cut in payment for the order
SECOND STRIKE	50% cut in payment
THIRD STRIKE	You're out!

Source: Tom Parisi, business systems specialist, Leviton Manufacturing Co.

> **Just a few short years ago, it was "put the product on the truck and then forget it." Now we have to pay attention to consumer buying habits . . . and we have to think much more like business people to change the whole business process, says Donald Lacher, MIS director at Totes, Inc. in Loveland, Ohio.**

hot potato

When a company smack dab in the middle of the supply chain — such as jeans maker Levi Strauss & Co. — finishes complying with demands from the big retailers, what does it do? It turns around and makes the same demands on its own suppliers.

Then, the middleman learns some lessons about supply-chain politics.

"We told our suppliers to put bar-code labels on their shipping containers," recalls James D. Sykes II, manager of standards and technology at Levi's Global Quick Response unit. "They responded, 'When you start scanning them, we'll start labeling them.' "

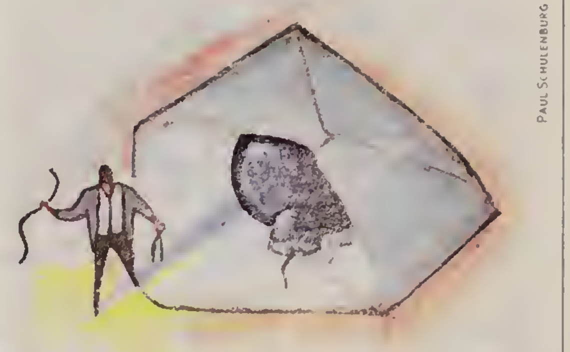
"Our people said that when the suppliers put the labels on, they'll buy the scanners. It was a chicken-and-egg situation," Sykes says.

The impasse was resolved — and the suppliers complied — once Levi's business managers explained their solid commitment to labeling.

The suppliers realized "it wasn't just the technicians asking for it," he says.

—Mitch Betts

one way to defuse a letter bomb?



The "letter bomb" phenomenon is not limited to the retail supply chain. The Big 3 automakers, for example, require suppliers to use whatever product-data exchange formats they use internally, says Livingston Davies, founder of Windsor, Conn.-based Cadkey, Inc., a vendor of computer-aided design software.

The automakers helpfully provide terminals for sending the data, but the training burden for the differing systems falls to the suppliers, he says.

One result: The supplier may stash the terminal in the closet, use translation software to arrive at the proper format for each automaker and bring out the terminal only when visitors show up.

—Mitch Betts

IS marks the spot?

Information systems plays a critical support role in choosing call center locations. Should involvement start sooner?

By Leslie Goff

It seems logical that information systems should play a primary role in determining the location of a call center. But it ain't necessarily so.

Larry Etienne knows that business concerns — such as tax incentives and a large pool of trained, available workers — really drive that decision. IS considerations come second.

"Normally, IS doesn't take the leading role. . . . Business has to drive our technology, not vice versa," says Etienne, the general manager of Reed Telemarketing in Omaha, which performs outbound telemarketing for publishing companies.

But in the case of call centers, there can be no business without the technology. Call centers link computers and telecommunications to provide on-line customer service and inbound and outbound sales support applications that many companies see as critical to their continued profitability.

Applications can range from outbound subscription fulfillment to guiding a customer through the diagnosis and repair of a home appliance.

Call centers are popping up all over as companies increasingly look for low-cost ways to reach new and current customers. In fact, $250 billion in goods and services were sold over the phone in 1992, according to Linda Ewing, group manager for 800 strategic marketing in Sprint Corp.'s business services group, who cites a 1992 study by the Pelorus Group, an independent research firm.

Moreover, the study indicates U.S. companies will spend $10.5 billion annually on call center equipment and services (excluding labor) by 1997, more than double the $4.97 billion spent in 1991.

Sales and customer service are the biggest applications. Nevertheless, according to call center managers, IS typically gets involved after a corporate decision has been made to establish a call center and a location has been chosen.

Before they call in IS, call center managers say they evaluate the costs of setting up and operating in an area, the availability of skilled workers, potential state tax incentives and other offers of support by local economic development councils and the area's overall telecommunications infrastructure.

The role of IS

Once a decision has been made, IS is brought in to coordinate efforts with a team of telecommunications experts to determine whether the site will have adequate power, line access, support services and labor to facilitate the center's applications (see chart).

"Telecommunications are often driven by the facility manager. But whether they are in the same department or not, IS and telecom must work closely together," Etienne says. "You have so much electronic transfer of information in a call center that you have to make sure it's all in coordination."

While companies won't usually look to IS to help choose a call center's location, IS can rule out a location if it determines the area cannot support its needs, says Jack Heggland, a partner with T.H.E. Consulting Group in Wheaton, Ill., a telecenter consulting group formed by three former Sears, Roebuck and Co. executives involved with the retailer's former catalog ordering operations.

"IS [at Sears] could have veto power but only if it could prove, for instance, that the local phone company wouldn't be able to support the flow of calls," Heggland says.

Things to consider

In addition to evaluating the telecommunications infrastructure, IS should determine the cost of installation, the serviceability of the location and access to the general area and the availability of local disaster-recovery services, notes Rick Hoefert, an executive vice president at Zacson Corp., a call center service bureau in Pleasanton, Calif.

"You need a team of IS people with an initial emphasis on the telecom side," he adds.

Donna Ehlers, another T.H.E. Consulting Group partner, says she sees the potential for IS to play a larger role in shaping call center strategy and tactics. For instance, at Sears, applications developers were already working on the software for its former catalog call centers before management had chosen the locations.

"I would give my eyeteeth for an IS person to come to me and say, 'This is what we need to do because this is how we can serve the business, the end user, the customer,'" she says. "That would be a big contribution."

Sounds like there's more of a call for IS involvement in call centers than meets the eye. ■

Goff is a free-lance writer in New York.

Practical tips

Advances in telecommunications make it conceivable that a company could set up a telecenter just about anywhere. But while all locations are roughly equal, some are more equal than others. IS still needs to evaluate any potential location for certain criteria, such as the following:

- **Clean power, backup power and clean backup circuits in the building where the call center will be.**
- **Digital cables to access long-distance carriers. Rural communities without them may be limiting.**
- **The "point of presence," where the long-distance carrier's lines hook into the local phone company's, should be modern and reliable. Look for fiber-optic cable and digital switches to ensure quick access to and transfer of data. Evaluate the relationship between the carrier and the local phone company and the expense of connections. Determine whether the phone company's central office is digital or electrical/mechanical.**
- **Local IS talent. The call center will need on-site IS support, so evaluate staff to ensure it's staffed appropriately.**
- **Local support services, access to the area from out of town and other factors related to crisis management. Even minimal downtime can mean serious losses.**

Calendar

FEB. 13-FEB. 19

The 1994 Annual Healthcare Information and Management Systems Society (HIMSS) Conference & Exposition. Phoenix, Feb. 13-17 — Contact: Andy Pasternack, HIMSS, Chicago, Ill. (312) 664-4467.

Sigda: Workshop on Field Programming Gate Arrays. Berkeley, Calif., Feb. 14-15 — Contact: Association for Computing Machinery, New York, N.Y. (212) 944-1318.

The Sixth Annual Software Support Conference. San Francisco, Feb. 14-16 — Contact: Jan Rosenthal, Institute for International Research, New York, N.Y. (212) 661-3500.

Mobile World. Dallas, Feb. 15-17 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Networks Expo '94. Boston, Feb. 15-17 — Contact: Bruno Blenheim, Inc., Fort Lee, N.J. (201) 346-1400.

Distribution/Computer Expo '94. West Irvine, Calif., Feb. 16-17 — Contact: C. S. Report, Uwchland, Pa. (215) 458-6410.

Government Technology Conference SouthWest '94. Austin, Texas, Feb. 16-18 — Contact: Government Technology Conference, Sacramento, Calif. (916) 363-5000.

FEB. 20-FEB. 26

Share Winter 1994 Meeting. Anaheim, Calif., Feb. 20-25 — Keynote speaker: Ellen Hancock, IBM senior vice president and group executive. Theme is "Interoperability on the Workstation." Contact: Share, Inc., Chicago, Ill. (312) 822-0932.

Documation '94 Conference & Exposition. Los Angeles, Feb. 21-25 — Contact: Graphic Communications Association, Alexandria, Va. (703) 548-2867.

The Fourth Annual East Coast Oracle Developers Conference. New York, Feb. 23-26 — Contact: Adirondack Information Resources, New York, N.Y. (212) 759-3632.

Representing the Technology Client: Critical Legal and Business Issues for the Computer Lawyer. Atlanta, Feb. 24-25 — Contact: Barbara Fieser, Computer Law Association, Fairfax, Va. (703) 560-7747.

Speech-Recognition Applications: What Works, What's Next. San Francisco, Feb. 24-25 — Contact: Chuck Sheppard, Probe Research, Inc., Cedar Knolls, N.J. (202) 285-1500.

MacFair '94. New York, Feb. 26 — Contact: New York Mac Users' Group, Inc., New York, N.Y. (212) 473-1600.

FEB. 27-MARCH 5

The Groupware '94 Boston Workshop Solutions Conference & Expo. Boston, Feb. 27- March 2 — Contact: The Conference Group, Scottsdale, Ariz. (602) 661-1260.

Application Development World & Objex. San Francisco, Feb. 27-March 3 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Reseller & Integrator Symposium on Document Imaging. Santa Clara, Calif., Feb. 28-March 2 — Contact: The Rheinner Group, North Scituate, Mass. (617) 545-7027.

Engineering Document Management Systems '94. Orlando, Fla., Feb. 28-March 3 — Contact: The Kalthoff Group, Cincinnati, Ohio (513) 871-6808.

Ninth Annual Computers In Libraries '94. Arlington, Va., Feb. 28-March 4 — Contact: Mecklermedia, Westport, Conn. (203) 226-6967.

Pen-Based Expo and Mobile World. Boston, March 1-3 — Focus: mobile computing. Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3870.

MARCH 6-12

Daratech CAD/CAM, CAE Strategy Workshops. Cambridge, Mass., March 8-9 — Contact: Daratech, Inc., Cambridge, Mass. (617) 354-2339.

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The CW Guide to Servers and Superservers

2 out of 3 ain't bad

Reliable

Scalable

Manageable

You name it, it's been positioned as a departmental server. Traditional minicomputers are now challenged not only by Unix boxes but also by **PCs AND SUPERSERVERS** as a platform for your applications, from the mission-critical to the merely mundane.

These newer technologies trumpet a tempting bang for the buck. The question is, can you trust key applications to these systems? Speed is not enough. Your servers have to be **RELIABLE, SCALABLE AND MANAGEABLE.**

So we first asked IS pros how superservers and symmetric multiprocessing PC servers stack up in those three vital areas. The **REPORT FROM THE FIELD** (SEE PAGE 100) is that these systems have made a lot of progress in reliability and scalability. However, they still leave a lot to be desired in the area of systems management, particularly if you are switching over from a mainframe background.

We also asked a panel of expert consultants to weigh the **PROS AND CONS OF DIFFERENT TYPES OF SERVERS** (SEE PAGE 100). And a LAN coordinator shares his experiences to prepare you to **WADE THROUGH THE SALES HYPE** to find the box that matches your needs (SEE PAGE 120).

Users find PC servers, superservers solid alternatives

By Joanne Cummings

Looking for a server for departmental applications? Users say superservers and symmetric multiprocessing (SMP) PCs are increasingly viable options — as shown by the $633 million in sales those systems racked up last year, according to International Data Corp. figures.

DIAGNOSTIC AND ADMINISTRATIVE TOOLS ARE STILL LACKING COMPARED WITH UNIX SYSTEMS AND MINICOMPUTERS

Many superserver users who have graduated from smaller PC environments express great satisfaction with these sleek new boxes. However, there is still room for improvement in these relatively new server technologies. Users and analysts agree that particularly those migrating from mature mainframe environments are in for a big adjustment. PCs and superservers offer excellent performance and have made great strides in scalability and reliability, but they are still immature in the area of systems management.

Chicago and Northwestern Transportation Co. found that out when it downsized its mainframe customer billing application two years ago.

As do many companies, Chicago and Northwestern needed a server with a PC architecture to run specific software packages — in this case, OS/2 and Microsoft Corp.'s SQL Server. "We wanted to use a PC-compatible platform to minimize all the different environments we had to deal with," says Jeff Johnson, director of accounting systems at the Chicago-based firm.

The company purchased multiple Tricord Systems, Inc. Model 40 servers, and Johnson says the move has worked out well overall.

The Tricords lack systems management tools, however, and that is an issue. "It's just a totally different ball game than what somebody coming from a mainframe would be used to," Johnson says.

For instance, performing backups for the servers has not been an easy task. "Backups have been a long, hard journey," he says. "We dump our SQL databases across PCNS, the Thomas-Conrad high-speed fiber network, to a Novell [NetWare] file server. We then run backup tape off of there."

Johnson says he did not pursue running backups directly off the Tricord because he wanted to offload the processor from any extraneous duties. "We try to break up things as much as we can, and when I can dump a database at 20M bytes a minute across the wire, that's pretty fast."

A superserver is a **"multiple processor-capable system that is designed to handle application serving by providing a necessary level of data integrity, security and availability," according to Tom Kucharvy of Summit Strategies.**

Simple Network Management Protocol (SNMP) support is another systems management area where superserver vendors are struggling to catch up, according to Summit Strategies, Inc. analyst Tom Kucharvy. Most vendors currently are not SNMP-compliant, which forces many managers "to shift among different packages in order to manage entire networks and identify performance bottlenecks," Kucharvy notes.

Areas of success

In key areas other than systems management, however, Chicago and Northwestern's Tricord systems show how much superservers have matured to become a workable server option for critical departmental applications.

For example, Johnson can easily boost the boxes' performance. Each runs a single 486 66-MHz processor, which can be upgraded. "We bought the machines with 486 33-MHz processors, which was all that was available in early 1991," Johnson says. "Since then, I've gone to 486 66-MHz. And if and when they start shipping Pentiums, we'll take a look at them and see what sort of performance gain there is."

Storage and system memory can also be increased easily. "We have about 8G bytes of hard drive space, with 16M bytes of memory on each machine," he says. "The only reason we don't have more is because we're running OS/2 1.3. If

pros and cons

EVERY ANALYST OR CONSULTANT HAS A DIFFERENT WAY TO GROUP THE VENDORS PLAYING IN THE SERVER MARKET, BUT HERE IS A ROUGH CONSENSUS ON THE STRENGTHS AND WEAKNESSES OF VARIOUS TYPES OF SYSTEMS.

Compiled by Michelle Louzoun, a free-lance writer in Great Neck, N.Y.
Consultants who participated include John Logan, Aberdeen Group; Stan Schatt, CI/InfoCorp.; Lynn Berg, Gartner Group, Inc.; David Fiedler, InfoPro Systems; Susan Frankle, International Data Corp.; David Hudson, Standish Group.

PCs and Symmetric Multiprocessing PC Systems

COMPAQ'S PROLIANT SERVERS

KEY PLAYERS: AST Research, Inc. Manhattan SMP, Compaq Computer Corp. ProLiant; Acer America Corp. Acer Altos 17000; Hewlett-Packard Co. HP NetServer LM; Wyse Technology Corp. Series 7000i.

STRENGTHS: Most inexpensive option with an average price of $6,000 to $8,000 for a standard PC and $25,000 for a multiprocessing PC. This is a commodity product, which means it's easy to find professionals who can operate, service and provide parts for the machine. Large selection of personal and small business software.

WEAKNESSES: Limited as file server because I/O cannot be broken down among processors. There is a dearth of departmental, applications development and systems management software when compared with traditional minicomputers, RISC Unix and high-end Intel Corp. boxes. Current transaction-processing software cannot deal with fine granular issues of error such as recovering from a failure in the middle of a transaction.

NEW DEVELOPMENTS: Several vendors now offer RAID storage systems, built-in diagnostic software, higher-performance Pentium chips and three-year warranties. An array of software for OS/2 and Windows NT is expected within the next six months to a year.

Superservers

A NETFRAME POWERFRAME SUPERSERVER

KEY PLAYERS: Tricord Systems, Inc. PowerFrame Enterprise Servers; NetFrame Systems, Inc. NetFrame; IBM PS/2 295 (formerly a Parallan Computer, Inc. product). (Many analysts would include HP 9000 Series 800, AST Research Manhattan SMP and Compaq ProLiant servers in this group.)

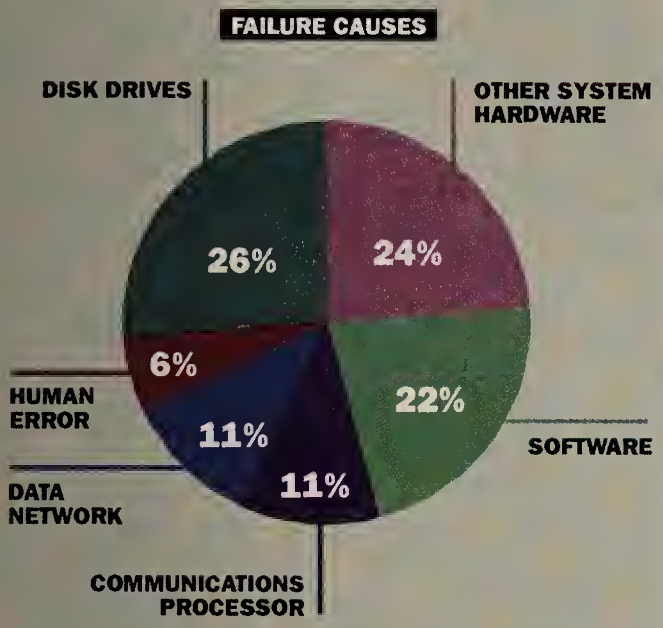
STRENGTHS: Good file server; can divide I/O among processors. High level of fault resiliency including some redundant components and sophisticated fail-over capabilities. Some built-in systems management software.

WEAKNESSES: More expensive than a PC — the average price is $50,000. As a result, this type of machine is not recommended for workgroups of less than 25. They run the same software packages as PCs, so again, there is not as much departmental or applications development software when compared with traditional minicomputers and RISC or high-end Intel Unix boxes. These are specialized computers and thus are typically harder to service.

NEW DEVELOPMENTS: Vendors are working to increase memory, add more storage and provide Pentium processors. Departmental and applications development software for OS/2 and Windows NT is expected within six months to a year.

crash

HARDWARE PROBLEMS account for half of all on-line PC server and superserver failures, according to Summit Strategies. **DISK DRIVES ARE THE BIGGEST SOURCE OF TROUBLE,** so that is where most PC and superserver vendors are focusing their availability improvement efforts. **RAID SUPPORT** is one of the most popular solutions.



Source: Summit Strategies, Inc., Boston

we go to OS/2 2.1, we can easily increase that."

Chicago and Northwestern helped ensure scalability by carefully redesigning its customer billing application as well. "We designed the application so that it could be split across more machines," Johnson says. The company can simply add more servers if processing requirements grow.

The company's superservers have also been up to the reliability challenge, Johnson says. Problems with the machines have been minimal. "In the two-plus years we've been running them, I've had one motherboard crap out and a couple of power supplies," he says. "That's not too bad considering we run the systems 24 hours, seven days a week."

Vendors respond

That's progress, according to Kucharvy. Until recently, most PC-based servers suffered from high failure rates and slow recovery times. To combat those problems, most PC and superserver vendors are starting to offer high-availability features such as dual power supplies, hot replacement of defective components, more sophisticated monitoring tools and redundant arrays of inexpensive disks (RAID) compliance.

Instead of downsizing from mainframes, McGraw-Hill, Inc. moved up to a superserver from standard PC servers.

Bruce Ruzinski, senior microcomputer specialist at the Hightstown, N.J., publisher, last year faced the need to increase the number of Compaq Computer Corp. PC production servers at the firm from eight to 12 to handle burgeoning processing requirements. The servers were running McGraw-Hill's word processing, accounts payable and accounts receivable data-entry applications. In addition, the company wanted to add support for Oracle Corp.'s Oracle 7 relational database.

Instead of purchasing four more Compaqs, though, McGraw-Hill decided on a single NetFrame Systems, Inc. NF400. The machine is configured with six 486-based, 66-MHz I/O processors and one 486-based application processor. With 64M bytes of memory and 2.7G bytes of SCSI storage, the box can handle the firm's current processing needs and more, Ruzinski says.

"We have anywhere from 170 to 200 users a day on this system, and it handles everything nicely," he says. "NetFrame does timeplexing on the bus, which gives you very fast, consistent response times, and it also allows you to gracefully scale the machine." NetFrame's architecture is based on a series of buses ranging from 12.5M byte/sec. to 100M byte/sec. Timeplexing divvies up data movement such that higher-bandwidth data is assigned on the fly to faster buses.

"With a PC, everything is contending over a single bus architecture that you can saturate relatively quickly," Ruzinski says. "And if you need to scale up the PC, you have to buy a whole other box. Not so with the NetFrame," he says. For example, when McGraw-Hill decided to add the database to the server, it simply purchased the application processor and added it to its existing NetFrame system.

Symmetric multiprocessing

(SMP) means all the CPUs can work in concert on application processing.

Regarding systems management, Ruzinski says the superserver is an improvement over multiple PCs. "Look at it this way. I used to run around here like a chicken without a head trying to keep all those servers running, and now I can do it without run-

Servers, superservers, *page 119*

RISC or High-End Intel Unix Boxes

HEWLETT-PACKARD'S HP 9000 PRODUCT LINE

KEY PLAYERS: IBM RS/6000 Powerservers; Sun Microsystems, Inc. SPARCserver 1000 and SPARCcenter 2000; Digital Equipment Corp. Alpha servers; Pyramid Technology Corp. servers; NCR Corp. 3500 and 3600 servers; Sequent Computer Systems, Inc. Symmetry 2000; Data General Corp. Aviion servers.

STRENGTHS: These systems offer some of the best communications packages and a good selection of departmental applications. They are the most expandable machines; significantly more capacity can be added without replacing the box. They attract developers on the leading edge of software for complex distributed environments such as object brokering.

WEAKNESSES: Compared with traditional minicomputers, these machines crash more often because their operating systems aren't as reliable in tracking errors. Unix boxes don't offer as much security as proprietary minicomputers because applications don't have to go through an access control list and users can log on to a system from any terminal. Also, they are not as strong in terms of handling soft errors.

NEW DEVELOPMENTS: Vendors are working to incorporate faster chips, add more processors and enhance their clustering ability. Several are working toward improving their soft-error capabilities.

Traditional Minicomputers

A LOW-END IBM AS/400 MINICOMPUTER

KEY PLAYERS: IBM AS/400; Digital VAX VMS; Unisys Corp. A 7 System.

STRENGTHS: These systems offer the largest selection of departmental, systems management and application development software. They crash less frequently than Unix machines, PCs and superservers because their operating systems are more capable of tracking errors. Better security than Unix machines, PCs and superservers. Applications must go through an access control list, and a user must log on to the system from his own terminal.

WEAKNESSES: New functionality usually delayed by six months to a year compared with Unix systems; it is harder to get developers to write applications for these products unless the systems vendors have done a good job supporting the Posix interface. Customers are locked into one vendor for hardware, software utilities and support. This puts the customer at a disadvantage when it comes to negotiating a price.

NEW DEVELOPMENTS: Products being retrofitted to meet standard industry networks and applications. Digital VAX and Unisys A 7 systems now have RISC processors; IBM is moving in that direction.

Fault-Tolerant Minicomputers

A STRATUS XA/R SERIES SERVER

KEY PLAYERS: Tandem Computers, Inc. NonStop Himalaya; Stratus Computer Corp.'s XA/R Series.

STRENGTHS: These machines are stocked with duplicate parts. As a result, they guarantee continuous availability. Duplicate components constantly check one another's data to make sure there are no errors, so the user is ensured of a high level of data integrity. These vendors have a good reputation when it comes to support.

WEAKNESSES: Fault-tolerant systems are a very expensive way to run departmental applications. Typically they are one-and-a-half to two times the price of a traditional minicomputer. There is very little third-party software available. These machines use proprietary components, which means you can't buy them off the shelf.

NEW DEVELOPMENTS: These systems are now incorporating RISC processors. Vendors are retrofitting machines to meet industry open systems standards.

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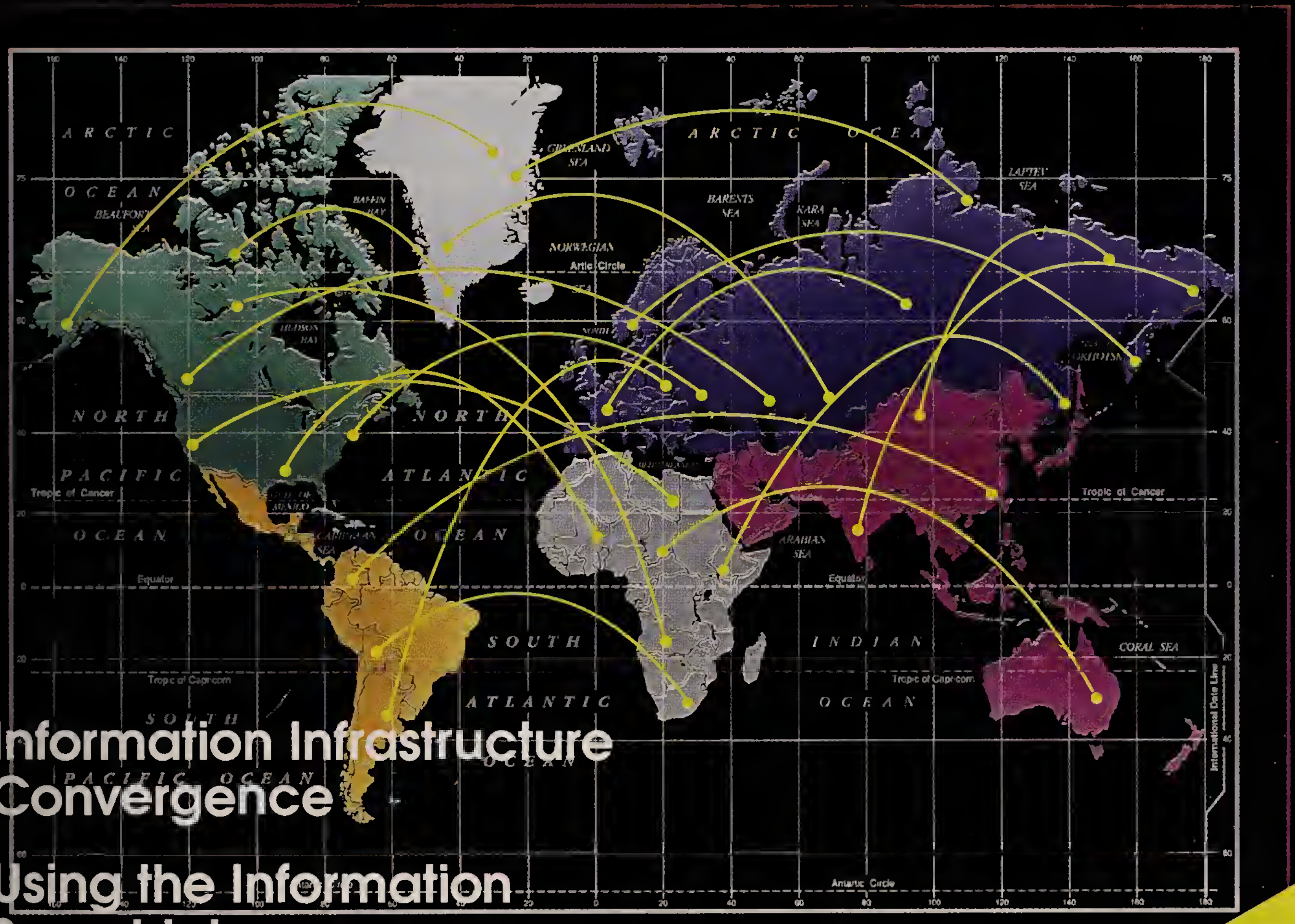

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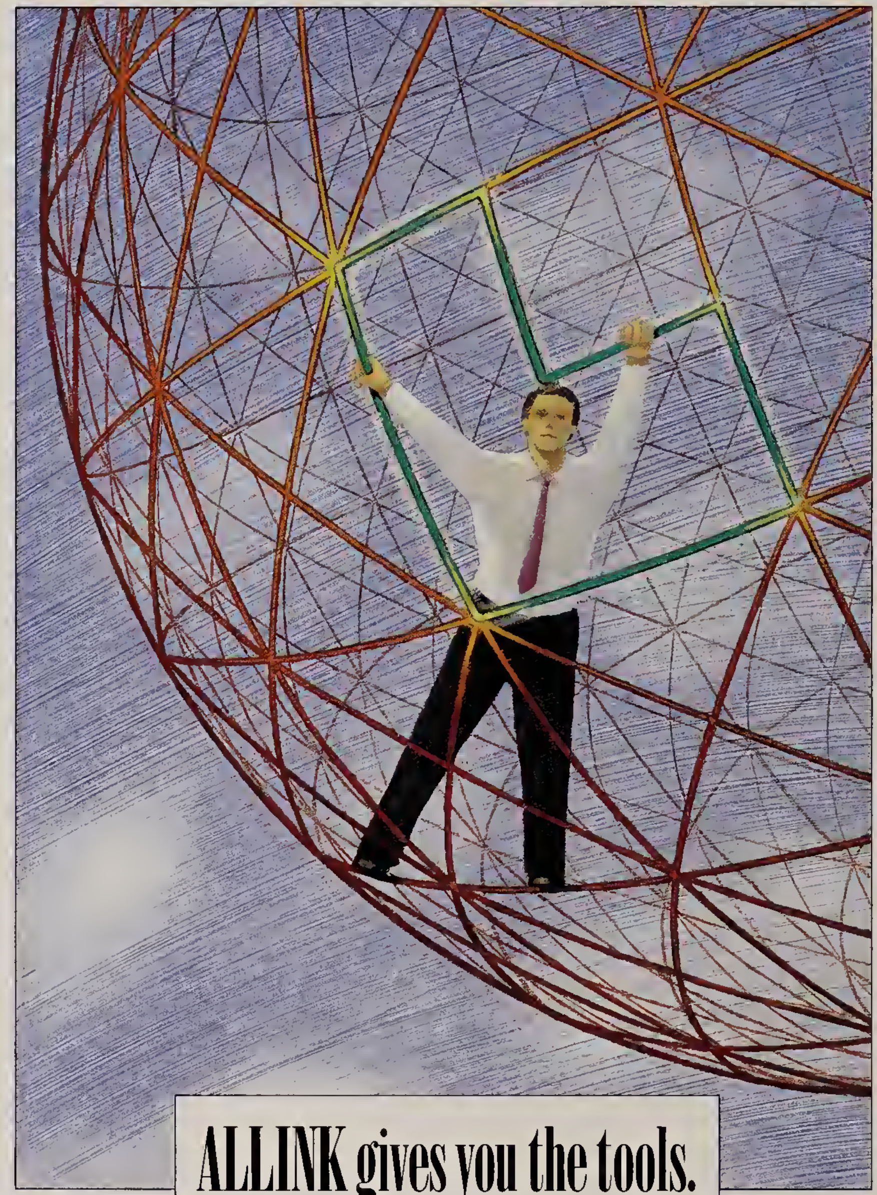

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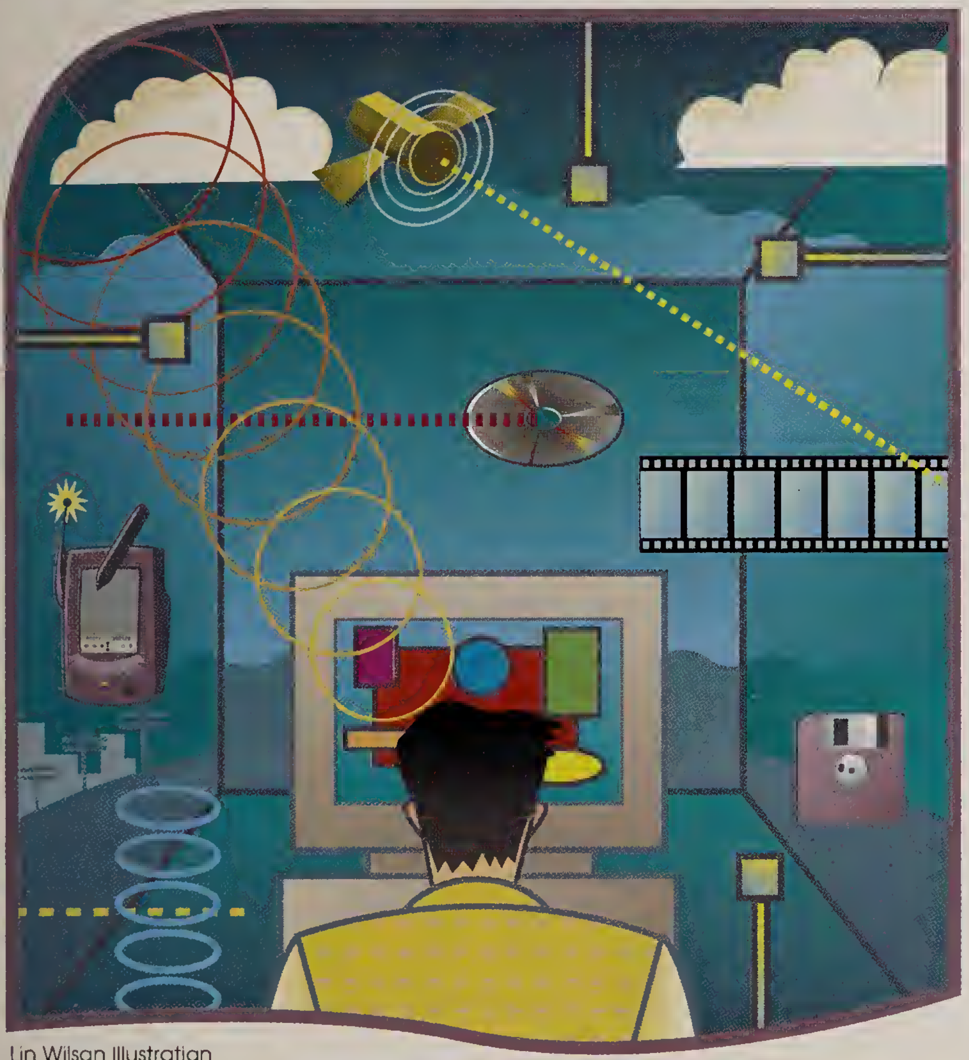
The Chinese proverb "may you live in interesting times," could have anticipated today's information industry. The convergence of computers, communications and user-oriented technologies is sweeping through the enterprise and catapulting us into the global marketplace. What seemed a pipedream only a few years ago is now a business and technical reality. IT professionals are in the forefront of forging a new technology-assisted business future. In this supplement we provide a glimpse of the enterprise networking technologies, applications and strategies that will help solve past and future computing problems, as well as revitalize IT organizations and the businesses they serve.

Ann Dooley
ComNet Supplement Editor and
freelance writer based in West Newbury, MA.

THE Future IS NOW!



Lin Wilson Illustration

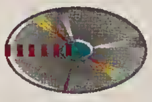
BY FRANCIS X. DZUBECK

Never in the history of networking will revolutionary changes occur more quickly than they are right now. Individual technologies will be able to work cohesively and the long-ballyhooed productivity improvements will finally be possible through more human-centric tools. When will this revolution begin? As the former football coach of the Washington Redskins, George Allen once said: "The Future is Now." Whether we call it enterprise systems or global networks, what we are watching are fundamental changes and convergence in our organizations' information network infrastructure.

Convergence of the information industry, information itself and the network infrastructures within the enterprise are symbiotic revolutions that must occur to facilitate the ubiquitous access and delivery of human-centric information. What does this mean for IS and the information industry? In 1994, the industry will see the alliance of entertainment companies with CATV companies. Telephony companies, not to be left out, are investing in CATV and entertainment companies. A current example is Bell Atlantic merging with Tele Communications, Inc. (TCI), a CATV company. Consumer electronics firms such as SEGA and computing firms such as Microsoft Corp. and Hewlett Packard Co. are all forming alliances with CATV companies. Publishers such as the New York Times and the Washington Post are also allying themselves with CATV and computing companies.

The information industry is experiencing a revolution in focus and direction based upon the abundance of emerging technology and current competition. Convergence on a global scale is inevitable and will create a single global information industry divorced of national boundaries and political affiliations. Information convergence will begin this year when numerous vendors start shipping inexpensive multimedia PCs, human-centric user interfaces and specialized information servers.

In 1994, we will see the first stages of intrinsic enablement of multimedia capabilities in the basic desktop and mobile PC. This trend will continue until every desktop and mobile PC purchased will be multimedia-enabled at no additional cost to the buyer. The intent is to expand multimedia beyond the realm of an educational tool or video game, and into the mainstream of the business on the desktop. Increased productivity through natural conversational collaboration via PC will finally unfold in the workplace after years of unfulfilled promises to management. Research performed by Communications Network Architects, Inc. indicates that the cost of multimedia enablement is the major stumbling block to ubiquitous multimedia deployment. With cost becoming a non-issue by 1998, almost ubiquitous corporate deployment will occur by 2003.



Already, last year, multimedia laptop PCs began to reach the marketplace containing a CD-ROM, stereo speakers, and active-matrix color screens. A multimedia laptop is an expensive but adequate extension of the multimedia desktop PC. This year, information convergence continues with the laptop being enhanced to include wireless access and mail for voice and slow-frame, narrowband video telephony. This personal data assistant (PDA) is the most mobile of all PCs. In 1993, the Apple Newton arrived on the consumer market and validated the potential of pen-based computing. PDAs will soon take another form with the addition of information convergence through wireless voice access and mail similar to laptop telephony enablement. An example of this type of information convergence ready for market this year is Simon, a collaborative effort of IBM and BellSouth, that looks like a cellular telephone but in reality is a handheld touch screen (used as the telephony dialing pad and visual display)-based PC. The PDA will eventually become your personal wireless telephone, electronic checkbook, appointment calendar, answering machine pager, calculator and address book.

> **"Multimedia deployment will occur by 2003."**

A human-centric user interface is a new concept where sight, sound and touch replace the inhuman constraints of the PC mouse and keyboard. Convergence of human sensory faculties with computing, combined with all forms of media usage (from text to full motion video) will increase user productivity by allowing users to determine:

(1) how they work best with the computer,

(2) how they meet the demands of the task they have to perform, and

(3) personal preference.

Productivity-oriented business applications such as customized remote access to multimedia information services, universal mailboxes (a variety of media delivered anywhere and anytime), intelligent telephony databases, language transcription, and voice/video interactive teleconferencing will soon appear in the marketplace to make use of the human-centric interface.

This new interface and its applications may seem like science fiction to the average PC user and far in the future for deployment. Remember "The Future is Now." IBM recently presented technology demonstrations of this intriguing human-centric technology where speech recognition/generation, continuous speech dictation, conversational surrogates, video conferencing/mail, and visual image presentation are coupled with smart agent software to impart a human-like persona to the PC. IBM will begin shipping this aggressive form of information convergence in the second half of 1994 for use in IBM's new PowerPC-based Power Personal Systems.

Recent industry trade shows contain exhibits from numerous vendors of video servers that store and allow simultaneous retrieval of images or full motion video. At present, the technology for each video server implementation is vendor proprietary. The nature of non-intrusive simultaneous user access demand forces multiple processor configurations to exist. Everything from mainframes (parallel multi-processor systems) to PCs (symmetric multi-processing systems) is currently being sold as video servers. The lack of quantification of video server "sizing," coupled with often unknown storage requirements, has slowed the growth of this form of specialized server.

To exacerbate the buyer's quandary, the existing LAN infrastructure has not been capable of supporting the multiple demands for simultaneous video server access. Solutions to this problem are now available using LAN switching hubs or collapsed backbone routers which guarantee bandwidth to the client. In 1994, with the advent of

100 Mbit/sec FastEthernet (100Base-X) and AnyLAN (100Base-VG) to the client desktop, this problem will go away and video server demand will increase with application availability. Also in 1994, voice servers are scheduled to appear in the marketplace that simulate selective PBX/Key System functions and attendant call distribution, and also perform voice mail functions. These voice servers, acting in conjunction with telephony-enabled, multi-media PC clients, will form a distributed voice/video PBX when connected to a switching hub/collapsed backbone or asynchronous transfer mode (ATM) LAN. This form of specialized server is still in its infancy but has the long-term potential, with the implementation of ATM to the desktop, to replace existing PBXs and key systems in most corporate environments.

"ATM is not a technology looking for a problem to solve."

Inherent in ATM is the ability to transmit multiple forms of information in a single isochronous digital bit stream. Therefore, a user will be able to communicate using interactive digital voice, video, text and data simultaneously across a single network infrastructure. Not all of these will be available to the user immediately, but any ATM network infrastructure may be software enabled at a later date to function in a true isochronous manner. The first place in which ATM will manifest itself will be in the premises. Initially it will be an interconnection mechanism for LAN hubs (e.g. concentrator hubs to a building-collapsed-backbone hub/router, building-to-building campus hub connection, and hub to router connectivity), but eventually, as the network interface card (NIC) prices decrease, it will be used for isochronous LAN connections for clients and servers.

In 1994, all major LAN hub and router vendors will ship OC3 (155 Mbit/sec) ATM interfaces for their products. In fact, a new form of ATM routing switch (also known as a periphery or edge router) will appear that combines ATM internal switching and external access with current LAN (Ethernet, Token Ring, and FDDI) interfaces to create local access to a campus or carrier data-oriented ATM infrastructure. Numerous interoperability standards such as "congestion control" and "dynamic bandwidth demand" which do not exist today will slow multivendor implementations, but will not stop the use of ATM for LAN broadband connectivity.

ATM NIC installations will dramatically increase as ATM VLSI semiconductor prices decrease. An important point to remember with respect to ATM NICs is that ATM pricing follows a semiconductor pricing curve (a 50% price reduction every year after market entry) which is demand and technology fabrication-driven. Communications Network Architects, Inc. research indicates that by 1996 ATM NIC prices will be almost within parity to today's Ethernet NIC prices and by 1998 prices will be so inexpensive that they will become a commodity. It is entirely possible that by 1999, for the first time in the history of the connectivity industry, standards will be in place, combined with unanimous market acceptance, to allow ubiquitous imbedded chip-level LAN enablement in PCs.

ATM is not a technology looking for a problem to solve, but rather a technology that enables the creation of the much needed information network infrastructure, using inexpensive semiconductor technology and standards to deliver scalable bandwidth from T1 (1.5 Mbit/sec) to OC192 (10 Gbit/sec). Very few components exist in a pure, homogeneous ATM Network Infrastructure. NICs are available for clients and servers and various types of switches for constructing the network infrastructure.

Within a building, ATM NICs will be point-to-point connected to ATM concentrator switches. These in turn will be point-to-point or ring-connected to an ATM premises switch for access to other building ATM premises switches in a mesh or ring, and/or to external information industry virtual or dedicated service providers. Within the information industry service provider network, a complete transport services infrastructure will be composed of layers of ATM switches scaled in capacity to meet isochronous demand needs.

Pragmatism dictates that initially no isochronous ATM-only network infrastructure will exist in any corporation. What will exist in 1994 is a hybrid infrastructure that will combine existing legacy hub-based LANs using Ethernet, Token Ring, and FDDI protocols, router-based internets, frame-relay-based SNA networks, and an ATM backbone network into a cost-efficient "first stage" broadband data-oriented network infrastructure. The "second stage" will add premises ATM switches for PBX access carrier ATM or circuit switched services. Subsequent "stages" will continue to build on this model until an end-to-end isochronous ATM-based network infrastructure is in place.

Attached to this network infrastructure will be a whole suite of specialized servers such as on-demand video services, voice/video/data mail services, information storage and query services, database storage and query services, management services, transaction processing application services, virtual intelligent network services, advanced intelligent network services, universal information services, voice translation services, etc. These servers may be a part of the private computing resources of the corporation or a part of the virtual services provisioning supplied by the converging information industry providers.

If this architecture and infrastructure seem simple, that is the intent. Management of such a converged network infrastructure is also simple due to the standardization of ATM hardware and software interfaces and interoperability specifications, the ATM deterministic switching model and the limited infrastructure component options. This is a case of designing an architecture with hindsight that has the potential for significant reductions in fault, configuration, performance and administration management. Carriers have no desire to confuse the customer with complex nonstandard network management. All carriers have standardized around SNMP/SNMPv2 for customer management access, but internally they will continue to implement CMIP for consistency and international standards conformance.

RBOCs, interExchange, independent, and PTT carriers all know the value of, and the requirement to deploy an ATM infrastructure in the 1990's. This is not a simple or inexpensive task for a carrier. Recent complaints that the carrier industry has been slow to deploy ATM technology are a result of the failure by buyers of communications services to understand the cost versus profit curve facing the industry. Buyers are demanding cheap geographically independent bandwidth at ever-increasing speeds; therefore, the carrier network infrastructure must be implemented and geographically distributed prior to customer demand. Significant capital expenditures must be incurred prior to revenue generation. In a regulated monopolistic environment, high rates could be justified until adequate demand satisfied the return of investment and profits. This year, we will see competition begin to blossom at the RBOC serving area and be in full bloom in the InterExchange marketplace. The future market for ATM services will be wide open, with competition on every front including the global marketplace.

Carriers face yet another ATM implementation problem in addition to competition. The problem is that the transmission cost of OC3 (155 Mbit/sec) to OC192 (10 Gbit/sec) broadband services is expensive. In prior carrier circuit switching architectures, the implementation cost for switching was more expensive than for transmission. The cost equation for carrier ATM implementation is the exact opposite. Synchronous Optical Network (SONET)/Synchronous Digital Hierarchy (SDH) implementation costs must decrease dramatically before cheap high bandwidth ATM services appear in the marketplace and ubiquitous geographical deployment, without expensive backhaul, can occur.

Numerous other carrier problems also exist, such as regulatory control of service offerings and seamless integration with the existing circuit-switched services infrastructure. The first problem is political and the second is technological. If ATM is an unregulated, enhanced service by definition of the FCC, then how can a state regulatory Public Utility Commission (PUC) say that it has the authority to regulate the exact same service. For ATM carrier services to meet customer cost and common service offering expectations, ATM must be unregulated from end to end. The problem of integration of the new ATM infrastructure with the existing carrier circuit switched services infrastructure is a matter of business reality. A customer must be able to call home from an ATM-enabled desktop without a problem. Interfaces are not yet complete between these two different worlds and grow significantly more complex when using such value-added services as 800 and Virtual Private Networks. All of these problems are transitory and will pass with time, however.

> **"What will exist in 1994 is a hybrid infrastructure."**

To make the information network infrastructure convergence complete, ubiquitous wireless access for voice, image, text and data must be integrated into the infrastructure to meet the needs of all of these predicted mobile applications. Today, three basic types of mobile wireless networks exist. Packet radio for data (9.6 Kbit/sec) and cellular for voice are part of the existing hodgepodge of segmented networks. This year will bring to market data transmission (19.2 Kbit/sec) using cellular digital packet data (CDPD) add-on to the existing cellular voice network infrastructure.

Three future wireless networks, personal communications services (PCS), low earth orbit (LEO) satellites, and direct broadcast satellite (DBS), have the potential to bring ubiquitous inexpensive wireless services into the information network infrastructure.

PCS voice equipment will be inexpensive (approximately $20 per phone) and PCS infrastructure switching vendors propose the potential of 128 Kbit/sec ISDN-like services for information transmission. PCS has the potential of becoming the inexpensive "local loop" or "last mile" for CATV entry into the residential low speed access business. In 1995, a major LEO satellite system is scheduled for initial operation. This system, called Iridium, is sponsored by a consortium led by Motorola and promises wireless information services from the deserts of Africa to the frozen tundra of Siberia. Prices for services are yet to be determined but may be prohibitive in all but remote geographical locations.

Direct broadcast satellite is not a new concept, but its competitive position against CATV is almost non-existent in the world except in Europe via British Sky Broadcasting and in Japan via AsiaSat. New technology has now enhanced this wireless broadcast video concept with the capability to deliver picture quality superior to VCR or CATV.

A last reminder, "The Future is Now," not later. Time will not stand still while a corporation decides to build a productivity-oriented, human-centric information infrastructure. Planning must begin today and re-engineering must occur now on a comprehensive information network infrastructure to meet the needs of new virtual and horizontal corporate organization structures being recommended by management planners and consultants in the middle 1990's.

Dzubeck is president of Communications Network Architects, Inc., a consulting company based in Washington, D.C.

Users Speeding Along the INFORMATION SUPERHIGHWAY

BY ELAINE L. APPLETON

Sixty miles outside Tacoma, Washington, wind whips torrents of rain across the highway. Water glistens on the black tar. It is 3:00 a.m. A pickup truck wanders across the center line. At the last second, its driver wakens and swerves, but it is too late to avoid an oncoming car.

The collision leaves one driver dead, the other with a badly broken right leg. An ambulance takes her to a remote rural hospital, where the doctor on call splints her leg and awaits the arrival, by daybreak, of a lightweight pneumatic cast designed specifically for fractures to the lower right leg. Barely four hours later, the doctor receives the cast and braces the leg. Because of such quick delivery, the doctor didn't have to apply an old-fashioned plastic cast, which is heavy, cumbersome and not as medically sound as an air-filled brace.

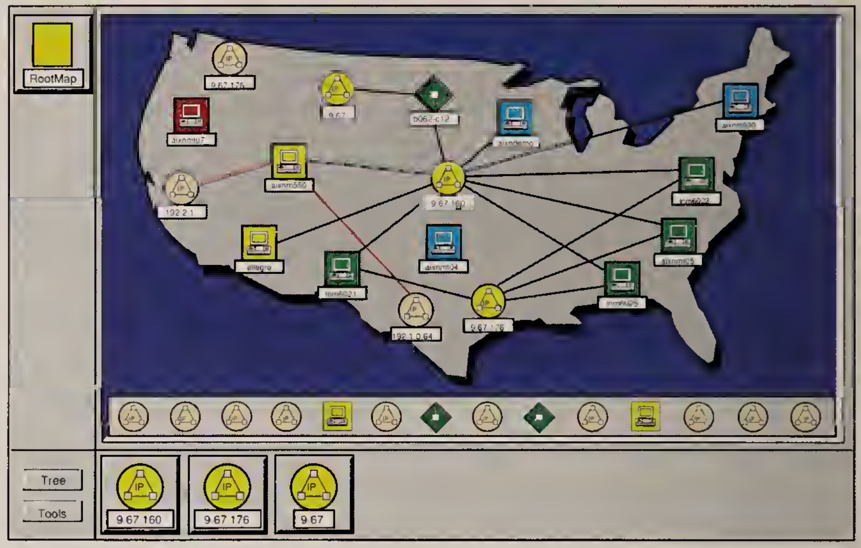
Impossible? In the near future, perhaps not. Aircast, Inc., a privately owned manufacturer of pneumatic braces, may soon fulfill system manager Ralph Bagen's vision of a networked just-in-time distribution system that uses advanced telephony, fax servers and customer service software to respond to emergency calls 24 hours a day — even during hours when no human being is working at the Summit, N.J. company.

To anyone who has even dreamed of the new products or services they would offer if they had access to multimedia, broadband networks, interactive video or any number of new technologies, Bagen's tone is familiar. He speaks with enthusiasm, tempered with reality, about what a combination of technologies will do for his company — that is, once he finds the time and money to put them all together.

As the concept of an information superhighway becomes commonplace, IT managers everywhere are spending more time dreaming of new ways to use information strategically. They aren't waiting for the information superhighway to be built, either: like Bagen, they are starting today to build their own regional, "limited-access" expressways that will carry everything from faxes on demand to interactive voice and video.

While most of these strategic thinkers think big, the majority of their current projects are practical outgrowths of existing information systems. Consider, for instance, how

Lin Wilson Illustration



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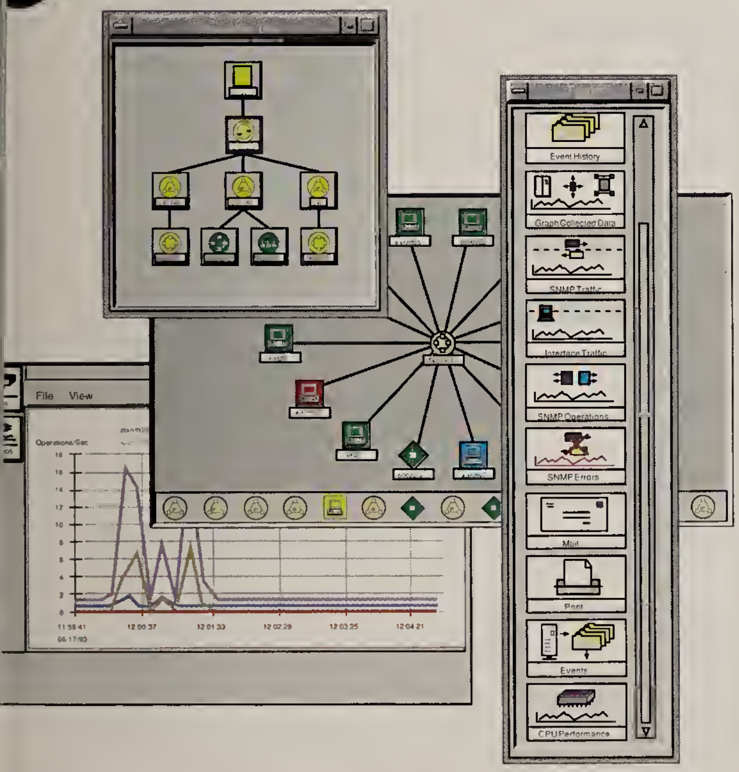

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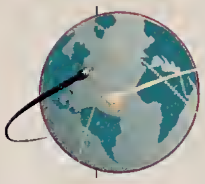


Bagen will make sure the hypothetical Tacoma patient gets her cast: A new phone system, installed to tie the company's three Summit facilities together, will include conversant technology. Like bank ATM machines, conversant technology enables users to "talk" with a company by pressing numbers on the telephone touchpad. The emergency room doctor calling at 4:00 a.m. will reach Aircast through its conversant system, which will be tied to a fax server. The physician will be able to request faxes of medical abstracts and product information, and to order the brace itself. "Because most [couriers] like FedEx, Airborne and UPS will stock products for you in distribution huts," Bagen says, "we can have our conversant call Airborne's conversant and trigger an order for one of our products that's sitting on their shelf, and have that leg brace to a hospital in time for an emergency."

Benefits to Business

The business benefits are obvious: the growing company will be able to accept orders 24 hours a day without hiring night shift workers to handle the phones. More important to Bagen, however, will be the ability to help physicians during medical emergencies, irrespective of where or when they happen.

Bagen's vision is an example of the most strategic innovations drawing upon new technology today — that is, it emphasizes the improvement of communication, not computation, says consultant Jim McGee, a fellow at Ernst & Young's Center for Information Technology and Strategy in Boston, and coauthor with Laurence Prusak of the book "Managing Information Strategically." What defines the most strategic uses of information in this new landscape, he says, are "efforts to take multiple technologies and multiple communication paths and weave them together into a new kind of service that's meaningful to the customer." The best such efforts will gather internal, and perhaps external, information and deliver it to the customer.

> "Today's most strategic innovations are communication, not computation."

Everywhere you look, you can find examples of this kind of information tapestry. Consider Landa, Inc.: the $25 million Portland, OR. manufacturer of high-pressure washing and waste water cleaning equipment put its price list of 10,000 parts on disk and distributed it to dealers. But that's only the beginning: Landa will soon put its 150 operator manuals, replete with CAD drawings and wiring diagrams, on disk and will ask its many component suppliers to add their manuals to the digital catalog, says Vice President of Finance Andy Gale. Once that's accomplished, says Gale, it will be easier for customer service reps, who will access the data through a Novell LAN, to walk east coast dealers through complex installation and service procedures. Down the road, Gale plans to add video and dial-in access as well, so that dealers could watch video clips of repair techniques, for instance, without leaving their shops.

Multimedia vs. Networks

Gale is by no means alone in desiring such a technological union in the service of his customers: that's what the information superhighway is all about. Any number of speechmakers have described the coming superhighway as one that will connect any one, any time, anywhere — and which will allow any of us to access data in just about any form. The problem: most people who are creating data byways now, like Gale and Bagen, have found that they can readily achieve the practical use of multimedia or networks, but not both.

For many businesses, it is the delivery vehicle that so far has proved more important than the interactivity provided by multimedia. Witness, for instance, Hammond Lumber, a five store sawmill and retail operation headquartered in Belgrade, Maine. Until three years ago, each lumber yard was its own island. Connectivity meant employees burned up the phone lines checking prices and inventory with each other.

Not only was the process unwieldy, it meant that Hammond couldn't quote up-to-the-minute prices to its contractor customers, a necessity in the competitive lumber market, which experiences constant price changes. "If in a remote store we tell a customer a two-by-four costs $2.25, and the market has just dropped to $1.95, we could easily lose $40,000 to $50,000 of business," says Tom Jewett, Hammond's computer consultant and president of Accudata of Maine, Inc., in Augusta. So when New England Telephone made 56 kilobit lines available in Maine, Hammond quickly leased lines and linked its stores. With that change, Hammond provided point-of-sale support to its remote locations, "a major change in the way we do business," says Jewett.

Cultural Obstacles

But "the biggest obstacles [to innovation] tend not to be technological any more," says consultant McGee. Rather, they are cultural. He argues that people run into snags when they need to negotiate multiple deals with multiple companies, many of which see themselves as competitors. To make matters worse, he says, "The people who are doing the negotiation are really technicians who traditionally have viewed all problems as technical problems."

As technology becomes easier to use, he says, "Traditional dealmakers say ' I can do this and this!' " To foster creativity, let marketers and designers play with technology; tolerate mistakes; and give people "slack time" to dream up new ideas, he advises. To develop new products

continued on pg. before
New Product Award Finalists

NETWORK MANAGEMENT

Staying in Control

BY J. SCOTT HAUGDAHL

Lin Wilson Illustration

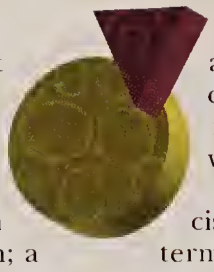
Are you overwhelmed by all the network management products coming out monthly from various vendors? Are the technology and buzz words getting you down? An over-the-counter antacid may help your upset stomach, but when it comes to settling your network management needs, take a deep breath, step back, and set a realistic (achievable) goal.

IS managers are beset by an ever expanding and complex web of variables that all play a role in network management. Some organizations are working to control growth, isolate faults, or react faster to problems. Others are searching for ways to optimize their network, generate usage baselines, or handle other routine tasks. Pity the poor company which is trying to do all of the above, and more.

IS managers need to take a hard look at their present and future application needs before being caught up in the extensive hype over the newest technology, and end up feeling compelled to "implement something." Remember to ask if the technology will translate into a better productivity or services for the company. If not, think again.

Unscalable Systems

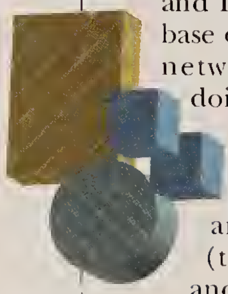
Bill Alderson, Managing Engineer at Pine Mountain Group, a network analysis and training company, notes "Companies have designed one unscalable system on top of another. They kept adding on, not taking the time to stop and rearchitect the network properly. Thus, they need good network management tools to figure out what they have, and what works and what doesn't, so that they can make intelligent design decisions to grow and maintain the network."



Most LANs share common characteristics: high bandwidth; a decentralized structure; diversity of protocols, technologies and vendors; and finally, LANs are often managed within themselves. For example, there are tools that come with the network operating system to provide user- and server-level resource management. In a more general sense, heterogeneous LANs (where the cable and internet are shared among many protocols and services) suffer from vendors operating with tunnelvision. No one is managing the whole system; i.e., the "Unix guys" manage TCP/IP and the "NetWare guys" manage IPX.

Myriad of Offerings

Managing the "enterprise network," or collection of interconnected networks, is complicated by the myriad of current network management offerings available. These often add to the confusion of determining what product to use, and where they would be most useful on the existing network. Even though common technical characteristics apply, each organization's network needs are different depending on business policies, applications, budgets, company and IS culture, and the installed base of systems. To some people, network management means doing an inventory of PCs to determine how may 80486's they have or tracking how many applications are running simultaneously (to check licensing compliance). To others it may mean providing a transport, making sure that data flows through the internet. To yet others, the management may be the cable; just keeping the cable up and running, tracking what connects to it and where.



Since LAN management tools are available for several different aspects and areas of a network, where do we start? One approach is to categorize the network or inventory into three major areas: application, transport, and cable. Doing so will clarify what needs to be managed and what tools will meet those needs.

A simple, but useful exercise, is to draw a line, placing terminal-to-host-type applications on the left side (low bandwidth, fast turn-around) and file transfer-type applications on the right (high bandwidth, low delay). Somewhere in the middle are the client/server applications.

The class of management tool that performs a real-time inventory of active applications and their associated data sets is useful here. After performing network-wide inventory of applications, classify them into groupings and show where they fall on the line. Then, concentrate on what network requirements these applications require. For example, if a company has a lot of terminal-to-host-type applications in use, a key issue is turn-around or good response time. In this case, management interconnect devices are important to make sure that the switching delays are very low, and that small packets are accommodated appropriately. In this case, low delay is more critical than high bandwidth.

> **"If the technology doesn't translate into better productivity or services — think again."**

However, as we move toward the other side of the spectrum in the file transfer (which includes such activities as copying files, loading large applications, and future multimedia applications involving voice and video), we start to need greater amounts of bandwidth to move lots of data to and from the application. Client/server requirements are somewhere in the middle, depending on the specific client/server application.

The important rules to remember are to survey the environment, determine how much data is involved, how fast it has to move, response time required, delay characteristics, and so on. Once that is well understood, you may then turn to a different type of management tool, a protocol analyzer, to determine the current response time (by looking at request/response packets) and bandwidth consumed by the application and its associated data. If a problem or bottleneck is suspect due to application-level symptoms such as time-outs or slowness, the protocol analyzer can then be used to trace the data flow of that application. This includes checking the transport level protocols (such as IP or IPX) to verify that they are working properly and efficiently.

For example, many applications read data only one byte at a time, which can add up to 12000 (sic) percent overhead! This abnormal behavior can be caused by something as minor as a programmer looking through the file one character at a time for a character string. By doing such traces, we gain another bonus: understanding traffic flow across the network to help us document the data flow and to identify potential bottleneck areas. Understanding the topology also helps place additional management devices such as probes and manageable wiring hubs in strategic locations for real-time monitoring.

If the transport protocols are experiencing bad packets or are unable to deliver data altogether, congestion or bad cable may be the culprit. For systems where congestion is suspect, internet bandwidths may be exceeded or not balanced properly, or a service may be overloaded. Internet bandwidth may be due to slow WAN lines. You may be inclined to add more WAN bandwidth, but a simpler and less costly solution may be to add more memory to the router to accommodate a larger queue during traffic bursts. Where a service is overloaded such as a NetWare file server, the analyzer will reveal "server busy" packets being sent back to the client.

To check cable, tools are required that physically test the cable. Cable testers range from simple twisted-pair conformance testers to those that display active stations (based on a nodes MAC address) and how much traffic and errors, if any, they are generating.

Dramatic Departure

Enterprise networks are a dramatic departure from the previous single vendor, minicomputer and mainframe environment in which the vendor was responsible for maintaining the protocols. Now, with distributed, multivendor networks, the burden has moved from the computer supplier and onto the shoulders of the guy in the trenches.

> **"The burden has moved from the computer supplier onto the shoulders of the guy in the trenches."**

When evaluating tools that are needed to manage applications, transports, and cable, realize that current methods may not be integrated and/or scalable. The lack of network-wide standards further hinders efforts to provide and promote a cohesive solution, despite the fact that SNMP is expanding its role beyond IP into management of devices ranging from UPS systems to workstations. (Despite that many vendors tout SNMP, most of them have added Management Information Base or MIB extensions to distinguish themselves from one another and to make the product useful(!). As an example, you may discover status information such as indicator lights from a certain hub are difficult to interpret on a "generic" SNMP management console, because of the way the information is displayed.)

Rather than trying to implement an "everything in the box" management system that does some things well and compromises other areas, consider solutions (distributed if need be) that are very strong in managing a certain area (such as packet analysis), and can exchange and interpret data with other management devices to maintain an overall picture of the network, its data flow and health. Such a system is certain to help keep networks humming.

Network management tools are increasingly useful; they can indicate the state of systems, whether devices are up or down, and if they are performing satisfactorily. However, to solve known problems, these tools must be used in a hierarchical manner. First, a full-time, real-time network management console (such as those monitoring SNMP router and hub agents) alert you to a problem. If the problem can't be resolved by information provided by the management console (for example, interpreting SNMP data), then a protocol analyzer is needed to isolate the problem to packet or physical problems. If the transport protocols are suspect, study them in detail, perhaps with the help of an "expert system" protocol analyzer. Finally, if the problem appears to be physical, try something as simple as checking the backbone and station wiring with a cable tester.

As network management and enterprise networks become more complex, IS managers need to be aware of the driving forces in their own network management strategy, understand their LAN environment, and be knowledgeable about the various management tools available. With this information, plus a network management plan, many network pitfalls can be avoided. EN

Haugdahl is an analyst at Architecture Technology Corporation, a research firm in Minneapolis.

Superhighway continued

and services, a company needs to marry creative dealmakers with technicians. "What you really need is the creative people, and then one grizzled, battle-weary veteran, who says 'OK, to make that work here's what you need to do,' " says McGee. Above all, he says, experiment. Get technology-based products and services out the door quickly; see what works and what doesn't, and adapt.

Grass-Roots Effort

What's simply convenient and time-saving for a large company, however, can be critical to telecommuters and tiny entrepreneurial companies. That's why regular citizens, like Richard Lowenberg of Colorado's Telluride Institute, are spinning long distance digital webs as fast as they can.

Lowenberg directs Telluride's InfoZone project, the first "grass-roots" effort in the nation that has connected a rural area directly to the Internet without an intervening university or corporate connection. The community's purpose: to make it easier for the ski resort's young people to remain in the area and to lure entrepreneurs and small businesses to move here. Telluride defines isolation. Surrounded by 13,000 foot mountain peaks, the 1,500-person town is 345 miles from Denver and 300 miles from Santa Fe.

To reduce the isolation, Telluride installed 56 K/bit connections throughout the community. Half of Telluride's residents own computers, and one hundred of them — almost 10% of the population — are hooked to the Internet. One small aircraft components manufacturer downloads sizable CAD files over the Internet; other telecommuters and consultants regularly send files over the network. As a result of Telluride's unique and growing digital attributes, Lowenberg expects an interactive media postproduction group to relocate here next year.

In typical grass-roots fashion, though, this effort goes far beyond the needs of business people. InfoZone will spend the next two years building voice, data and video connections between schools, libraries, museums and other public sites. Says Lowenberg, "People want to be part of vital communities, and communication can empower communities." EN

Appleton is a freelance writer with Fresh Air Communications, in Newburyport, MA.

COM NET
NEW PRODUCT
ACHIEVEMENT
AWARD

The third annual ComNet New Product Achievement Award Competition recognizes some of the new products that may be key to building enterprise networks in your organization. More than 80 entries were judged on innovation, industry contribution, integration with current product lines, migration capabilities, support, and return on investment.

ComNet attendees make the final selection by voting electronically for one winner per category, plus an additional grand prize winner. The award competition is managed by World Expo Corp. and sponsored by Computerworld.

ComNet '94 Show New Product Achievement Award Finalists

BEST NEW TRANSPORT TECHNOLOGY PRODUCT

T3 Plus Networking, Inc.
Santa Clara, CA

BMX45 Multimegabit Inverse Multiplexer

The BMX45 uses T1 links to meet broadband bandwidth requirements as a cost-effective, single solution, backup scheme for high-priority circuits in a T3 network. Providing an alternative to migrating to ATM and broadband, it offers flexibility in multimegabit backup and alternate rerouting.

RAD Data Communications
Mahwah, NJ

SPS-2 Miniature Multiprotocol Packet Switching Access Product

The plug-and-play SPS-2 offers easy access to switching in a frame relay service network on private or public networks. Able to be accessed from anywhere in the network, the SPS-2 has only two ports, instead of the standard 12, giving better cost performance for small branch office applications.

Sun Microsystems Computer Corp.
Mountain View, CA

SunATM

SunATM-155/MFiber and SunATM-155/UTP enable ATM usage in LAN environments at a high (155 Mbit/sec) performance and low cost. The SunATM includes support for TCP/IP over ATM, allowing a risk-free migration to ATM.

BEST NEW NETWORKING MANAGEMENT PRODUCT

American Power Conversion
West Kingston, RI

PowerNet SNMP Adapter

The adapter allows Internet users to economically integrate the management of UPSs and electrical power into the same management system that is used for monitoring the enterprise network.

IBM
Research Triangle Park, NC

NetView DM/6000

NetView Distribution Manager/6000 provides an architected approach to software distribution and change management under multiple operating systems using TCP/IP in the LAN and WAN. Users can choose one or more integrated platforms to manage software for heterogeneous clients in a network and to optionally centrally manage it from a centralized mainframe.

Phoenix Microsystems, Inc.
Huntsville, AL

WanPROBE

WanPROBE enables managers to know in advance that a WAN has problems and allows correction without taking the WAN out of service. This provides low-cost, proactive testing by any authorized user at any location on the network.

BEST NEW LAN AND INTERNETWORKING PRODUCT

Sun Microsystems Computer Corp.
Mountain View, CA

Sun100BaseT

Sun100BaseT provides 100Mbit/sec Fast Ethernet technology in an upgrade option which offers ten times the performance at less than two times the cost of current 10BaseT products.

Interphase Corp.
Dallas, TX

Interphase 4627 Network CoProcessor

An intelligent, SBus-based NFS protocol processing engine which off-loads network communications overhead from the host processor, the 4627 frees up server CPU cycles and lowers the cost of NFS operations per second. As a result, the cost per seat on a client/server network is lower, making performance-based client/server networking more affordable and available to a larger number of users.

OST, Inc.
Chantilly, VA

PASS

The PASS combines in a single unit six communication requirements of a typical branch office or small business, integrating a 10base T hub; a TCP/IP router; a packet switch; a multi-protocol concentrator for X.25, Frame Relay, SNA, and Asynch traffic; an intelligent ISDN terminal adapter; and a data compressor. Benefits include flexibility for WAN connectivity, cost reduction through LAN/WAN feature integration and management optimization.

BEST NEW CUSTOMER PREMISES EQUIPMENT

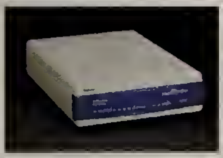
Stratacom Inc.
San Jose, CA

The FastPAD

The FastPAD is designed to provide legacy applications/systems/services with migration, allowing slower speed lines, from 9.6 Kbit/sec analog lines with modems up to 512 Kbit/sec subrate circuits, to become part of an ATM migration path.

U.S. Robotics, Inc.
Skokie, IL

Shared Access Fax Server



The Shared Access Fax Servers (for Ethernet and Token Ring) provide a low-cost integrated network fax solution for an unlimited number of end users.

Teleglobe Communications Inc.
N. Andover, MA

FR600 Frame Relay Link Module for CX1000

The FR600 allows the economical combination of voice, fax, LAN and data traffic over public or private frame relay networks. Frame relay data/voice networks can be constructed at rates up to full T1.

BEST NEW INFRASTRUCTURE PRODUCT

Optical Cable Corp.
Roanoke, VA

All Dielectric Self-Support (ADSS) Round Messenger Fiber Optic Cable

The ADSS cable allows aerial applications to be expanded to new areas and at a lower cost since additional materials aren't required. It also eliminates destructive lightning problems associated with aerial cables.

M/A-COM, Inc.
Hudson, NH

HOTSHOT Connector

The connector can be field-installed up to 30% faster than standard epoxy polished connectors and saves on installation time and expense.

E-COMMS, Inc.
Gig Harbor, WA

E-COMMANDER

The E-COMMANDER is an integrated and complete product for the monitoring and control of LAN/WAN devices at remote or local sites from a single location. It's modular approach provides flexibility for current or future applications.

BEST NEW MULTIMEDIA DESKTOP APPLICATION

Intel Corp.
Hillsboro, OR

Intel ProShare Personal Conferencing Video System 200

The System 200 enables face-to-face working meetings right from a PC. Any PC document can be used with a shared notebook and familiar tools for text, pen and highlighter. It is the first step in integrating the phone and the PC.

&

Intel ProShare Software

The ProShare software presents a shared on-screen notebook, connected PC-to-PC via a modem or LAN, so that users can simultaneously view, mark-up, or update documents, or any other information stored on their systems.

MCI Telecommunications
McLean, VA

MCI DataStream for Vnet

MCI DataStream for Vnet is a cost-effective way to provide the flexibility of distributed networking by extending MCI's virtual network to customers' branch offices and telecommuters. Simultaneous voice, data, and video can now be sent and received over a single digital line.

CISCO SYSTEMS

Your networking system hasn't lived until it has a multiprotocol router. It's something that Cisco should know a thing or two about. After all, they invented it. And by consistently emphasizing the importance of listening to customers Cisco has captured the worldwide market, owning over 50% of the router market.

NOVELL.

To those in the know, the mere mention of the name Novell strikes up images of successful networking. Their alliance with over 2,500 software, hardware and system vendors has helped them create NetWare, the operating software that allows systems as different as Microsoft, IBM, and Oracle to work together, seamlessly. In short, Novell is the industry standard in networking software. And that standard is our standard.

TELEGLOBE

It's all about working together. Teleglobe sets itself apart by working with leading manufacturers of bridges and routers to ensure flawless compatibility. And their reputation for reliability and outstanding support make them a leader in their own right.

!NTERPRISE

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If there's one thing we know about computer networks, it's that we don't know everything. No one does. That's why we've created !nterprise and partnered with other leaders in the communication industry. But above all else we believe the most important partnership we can make is with you. We can make it work.

MOTOROLA codex

It's about speed, and then some. Over the past thirty years, Motorola Codex has pioneered every analog transmission speed breakthrough in the industry, as well as setting the standard for the new Frame Relay protocol. But more than that, they have the ability to translate multiple protocols over a single network. They'll make it work. Quickly. Because you just don't have time to waste.

SynOptics

When you think of an intelligent wiring hub system, there's really one word that should come to mind: SynOptics. Not only are they the leader in market share, but their product development is unsurpassed, laying the groundwork not just for easy migration of applications today but to accommodate growth and future data strategies.

CONTINUED FROM PAGE 101

ning around," since he is working with one box instead of many, Ruzinski says.

Still, superserver vendors have a way to go and are working overtime to provide the level of diagnostic and management tools that data center information systems workers are accustomed to, according to Kucharvy.

NetFrame's RConsole software represents a step forward. RConsole enables administrators to configure and manage the box remotely. "You can assign the disk drive, the I/O processors, the application processors, the [Fiber Distributed Data Interface] card, all remotely," Ruzinski notes. "And it has another processor inside it that dials out in case of a power failure, disk-drive failure, I/O processor failure or any other critical thing that happens. It calls my house and tells me what happened, and that's a lot nicer than PC-based servers."

The SMP label

can be tricky, says Susan Frankle of International Data Corp. Whether a multiprocessor system works symmetrically or asymmetrically often depends on the software being run. Many superservers and PC servers work both ways depending on the circumstances.

The downside to the sophisticated superserver is cost. The initial price of a superserver is high compared with a PC system, and the overall cost is driven up in NetFrame's case by the use of proprietary parts that are expensive to replace.

"NetFrame is a little steep in price compared to the pure PC boxes," Ruzinski says. "But they are starting to address it. People should really haggle with them over the price if they want to get the best deal possible."

Superiority diminishes

Kucharvy notes that PC vendors have been slowly but consistently chipping away at the reliability and scalability advantages superservers once held over the standard PC server.

Users agree. "As far as reliability and robustness, this machine is probably as reliable as or more reliable than any mainframe," says Raymond Palazzo of his company's SMP PC server.

Palazzo is systems administrator at The Health Club, a subsidiary of Blue Cross & Blue Shield in Louisville, Ky. The company installed a three-processor Wyse Technology, Inc. 760MP about six months ago to run its health risk assessment application.

The Health Club works with Blue Cross & Blue Shield customer firms to help them reduce overall health care costs by conducting personnel profiles and analyzing overall health risks.

Palazzo has configured the 760MP with Microsoft's Windows NT Advanced Server, which enables him to take full advantage of the SMP capabilities of the box. "Typically all three processors run simultaneously, except when large print jobs come over. Then it will kick out one processor and assign that to print separately while the other two act together to do the processing."

Upscale machines

The Wyse system provides all the scalability Palazzo needs. With 16 users, the box never exceeds 40% capacity, he says, and because it is designed to accommodate five processors, Palazzo could always scale up the capacity by adding more processors or by upgrading the three he has to Pentium chips. Storage for the box is also highly scalable. "I've got 4G bytes of storage on it right now, and if we needed more, I could just stick in a disk array to give it more capacity," he says.

Palazzo selected the Wyse box to replace a standard PC file server. "We couldn't go with a RISC-based system because we really needed to run native DOS applications on the server," he says. "The machine needed to be specifically modeled for that because we're developing applications using C++ and Visual Basic, among others, and were deeply concerned about compatibility issues under RISC at the compiler level."

Superserver machines such as NetFrame's systems did not fit The Health Club's bill either. "We need a lot of processing power and really needed true symmetric multiprocessing," he says. "The most important thing to us is, because of the processing architecture, we can reboot applications without having to reboot the server," since each application is running on a separate processor. Palazzo says the box performs true SMP in that all three processors can handle information simultaneously, whereas in some machines labeled SMP, a processor must be set aside to handle resource allocation.

Palazzo's only complaint with the SMP system has to do with protecting his uptime. The drives are not hot-swappable. ■

Cummings is a free-lance writer in Marlboro, Mass.

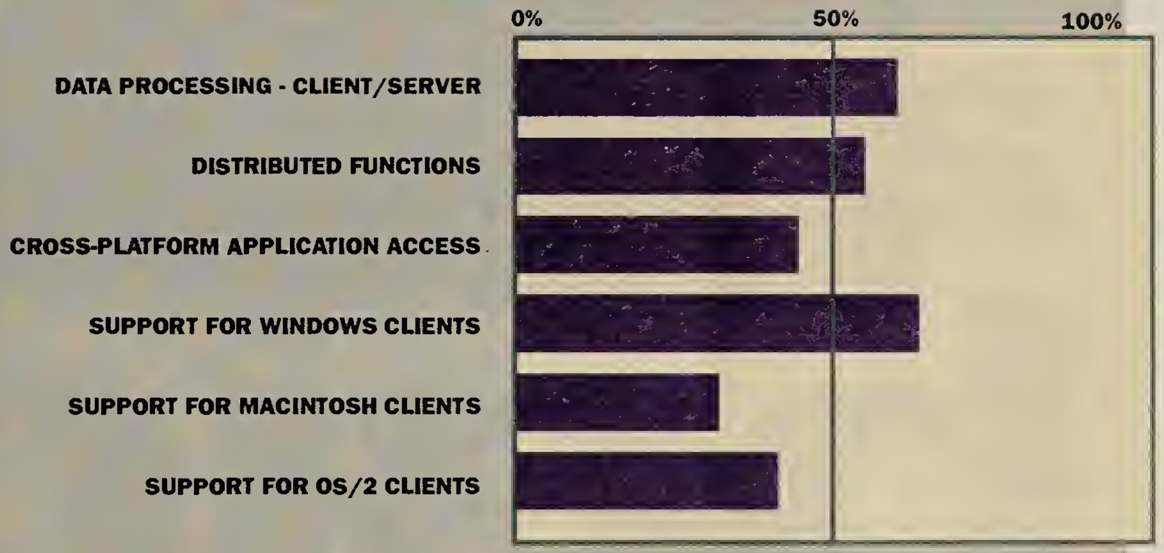
Nobody's perfect

PCs AND SUPERSERVERS still don't match the level of control provided by host-centric computing.

On the other hand, more mature **UNIX SERVERS AND OTHER MIDRANGE SYSTEMS** aren't perfect as departmental application servers either, according to Stamford, Conn.-based consultancy Gartner Group, Inc.

Gartner Group's yearly Midrange Systems Evaluation tests roughly 30 systems for performance, cost of ownership and robustness. In six areas that deal specifically with each computer's ability to function as a server, Gartner Group found that midrange solutions provide **JUST ABOUT HALF** of the functionality required for true client/server computing.

CLIENT/SERVER FUNCTIONALITY OF MIDRANGE SYSTEMS



conclusions

THE EVALUATION DREW SOME INTERESTING CONCLUSIONS ABOUT UNIX:

For the first time, **UNIX SYSTEMS EQUALED OR SURPASSED** proprietary midrange systems in overall functionality in 1993.

The total cost of ownership is still significantly higher for Unix systems, however. Much of the functionality is provided by third-party software vendors, driving up the price. Proprietary operating systems tend to offer more built-in features, especially in the area of database management.

cost

COST CAN INCREASE EXPONENTIALLY WITH THE ADDITION OF MORE USERS:

For all midrange systems, Gartner Group notes that "the competitive picture seems **QUITE DIFFERENT FOR CONFIGURATIONS BELOW 100 USERS THAN FOR THOSE ABOVE 100 USERS.** Several vendors appear to price according to a strategy that is quite aggressive in smaller configurations but exacts a price as the installation grows."

Also, some vendors with "a reputation for aggressive hardware pricing" do not look quite so rosy when the costs of software, maintenance and desktop integration are factored in.

SHOPPING TIPS

Ignore the hype and listen for the subtext

By Joe Busch

Remember the first time you shopped for a new car? Some sales folks were helpful, but others shoveled so much propaganda, they made it harder to buy, not easier.

Choosing a server is not much different from buying a car today. You probably have already defined what your basic needs are and how much you can afford to pay. Then you walk onto the showroom floor and the haggling begins. And the hype can get pretty deep out there.

A few simple ideas gleaned from my experiences will help you avoid being taken for a ride. When server shopping, these three truths have guided me: The future is not here today; delivery promises are susceptible to Murphy's Law; and listening is the essential skill.

In late 1992, I attended a vendor's presentation on what was described as "a really great server with every feature imaginable." During the presentation, the account representative touted a forthcoming feature to my boss: "... and with this feature you could let your employee sit on the beach in Hawaii and correct problems. Come to think of it," said the salesman, "you wouldn't even need your employee anymore!"

Ha ha. We bought the server and have been pleased with it, but it's 1994, and the feature is still not available. I'm glad I still have my job, but that trip to Hawaii would have been nice.

When it comes to actually receiving a box as promised, the rule seems to be that the more desperately you need the system delivered on time, the less likely it is that will happen.

Naturally, vendors sell to their strengths. Careful listening can avoid a bump down the road.

A server generally is not an "off-the-shelf" box waiting to be shipped. Often the CPU, memory, network interface cards and hard drives come from different manufacturers with varying levels of stock. Be sure to check the availability of every server component before you commit to a delivery date for a project.

Parts in hand

For example, we were once on a tight deadline to install a turnkey system. The server was the centerpiece of the entire project, so we stipulated a two-week delivery schedule. The vendor had most of the components in hand by the first week. However, by the third week, the memory still had not arrived, and we were forced to pay a premium to another vendor to get a complete server delivered. I now triple-check lead times with the vendor and still check them again two days before the scheduled arrival.

Naturally, vendors tend to sell to their strengths. Careful listening up front can help you avoid a bump down the road.

For instance, at a previous job I listened to an excellent presentation from a vendor salesperson. She stressed the server's reliability, high quality and cutting-edge technology. She glossed over the "minor technicality" that Novell NetWare support was not yet available — and we were a Novell shop! Good thing we listened closely, not only for what was said, but for what was *not* said.

Of course, none of these tips will work if you fail to first listen carefully to your own users. The challenge in server shopping is to make sure you can get what you need, when you need it.

Busch is a LAN coordinator at an insurance company in Fort Worth, Texas.

LOOK FOR OUR GROUPWARE WHITE PAPER IN THE FEBRUARY 7TH ISSUE

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The mighty MIPS R4400 RISC microprocessors.

Which isn't surprising, really. The NEC V_R4400™ 150MHz MIPS processor is already at the heart of the most powerful workstations in the world.

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The reason Microsoft chose the MIPS RISC architecture is simple—raw, unadulterated speed. In fact, NEC's V_R4400 runs Windows NT almost twice as fast as Pentium,™ and nearly four times as fast as the 486™ DX2/66.*

So before you buy a computer to run Windows NT, think about what's inside. After all, it only makes sense to choose the quickest processor that processed the program.

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Computerworld Editorial (January-June, 1994)

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Dec. 27 & Jan. 3	Dec. 10	Dec. 17	**Special Edition:** Annual Forecast Issue			
Jan. 10	Dec. 24	Dec. 31	**Closer Look:** Object Database Management Systems		Starch	Mails: Jan. 12 Close: Dec. 11
Jan. 17	Dec. 31	Jan. 7	**CW Guide To: Spreadsheets and Spreadsheet Utilities** The New Capabilities *Buyers' Satisfaction Scorecard:* Windows Packages from Borland, Lotus, Microsoft, etc. *Firing Line:* Latest Windows Offering			
Jan. 24	Jan. 7	Jan. 14	**Closer Look:** ATM	**ComNet** Washington D.C., 1/25 - 1/27		
Jan. 31	Jan. 14	Jan. 21	**CW Guide To: Departmental Servers and Superservers** Matching a System to Departmental Needs (including Alpha, Tricord, Netframe, Sun, RS/6000, NCR, Sequent, Wyse, Compaq) *Buyers' Satisfaction Scorecard:* Leading RISC Servers *Firing Line:* Latest Server Product	**Executive Technology Summit** Tarpon Springs, Florida 2/2 - 2/4		
February		Dec. 27	**CLIENT/SERVER JOURNAL**	All Shows Feb. - April	Harvey	
Feb. 7	Jan. 21	Jan. 28	**Special Quarterly Report:** Re-engineering the Workplace		Starch	Mails: Feb. 9 Close: Jan. 3
Feb. 14	Jan. 28	Feb. 4	**CW Guide To: Management Tools for Large Networks** What Works When Systems are Distributed *Buyers' Satisfaction Scorecard:* Multivendor Network Management Software from DEC, HP, IBM,Sun, etc. *Firing Line:* Latest Management Package	**Networks Expo** Boston, 2/15 - 2/17		
Feb. 21	Feb. 4	Feb. 11	**Closer Look:** Windows and OS/2 Imaging Software			
Feb. 28	Feb. 11	Feb. 18	**CW Guide To: Work Flow Software** The Reality Behind the Promises *Buyers' Satisfaction Scorecard:* Leading Work Flow Software Systems *Firing Line:* Latest Work Flow Managers	**GroupWare '94** Boston, 2/28 - 3/3		
Mar. 7	Feb. 18	Feb. 25	**Closer Look:** Desktop Laser Printers		Starch	Mails: Mar. 9 Close: Jan. 31
Mar. 14	Feb. 25	Mar. 4	**CW Guide To: RAID** Choosing Among the Various Levels of Disk Array Technology *Buyers' Satisfaction Scorecard:* Leading Server-based RAID Systems *Firing Line:* Latest Mainframe RAID Subsystem			
Mar. 21	Mar. 4	Mar. 11	**Closer Look:**Unix Workstations	**UniForum** San Francisco, 3/23 - 3/25		
Mar. 28	Mar. 11	Mar. 18	**CW Guide To: Wireless Networks** The Spectrum of Technologies, Including LANs, WANs and Radio Frequency *Buyers' Satisfaction Scorecard:* Leading Wireless LANs *Firing Line:* Wireless Services Product			
Apr. 4	Mar. 18	Mar. 25	**Closer Look:** Personal Productivity Software			
Apr. 11	Mar. 25	Apr. 1	**CW Guide To: NT vs. OS/2 vs. Unix** Desktop and Server Choices *Buyers' Satisfaction Scorecard:* Leading Server Operating Systems from IBM, Microsoft , Sun, etc. *Firing Line:* Latest Desktop Operating Systems from a Leading Vendor		Starch	Mails: April 13 Close: Mar. 17
Apr. 18	Apr. 1	Apr. 8	**Management Special:** IS Architecture in Times of Change	**AIIM** New York 4/18 - 4/21 **SIM Conference** Florida, 4/20 - 4/22		
Apr. 25	Apr. 8	Apr. 15	**CW Guide To: Data Access Tools** New Tools for Quick Access to Data Buried in Older Flat-file and Hierarchical Databases *Buyers' Satisfaction Scorecard:* Leading SQL-based Data Access Tools *Firing Line:* Latest Data Access Tool from a Leading Vendor			
May		Mar. 30	**CLIENT/SERVER JOURNAL**	All Shows May - July	Harvey	
May 2	Apr. 15	Apr. 22	**Closer Look:** Distributed Computing Environment	**Interop + Networld** Las Vegas, 5/2 - 5/6		
May 9	Apr. 22	Apr. 29	**CW Guide To: Mobile Computing** From Notebooks to PDAs *Buyers' Satisfaction Scorecard:* Leading Notebook Computers *Firing Line:* Latest Sub-notebook Product from a Leading Vendor	**International DB2 Users Group** San Diego, 5/8 - 5/12		Mails: May 11 Close: April 14
May 16	Apr. 29	May 6	**Special Quarterly Report:** Re-engineering the Workplace		Starch	
May 23	May 6	May 13	**Windows World Open Supplement** **CW Guide To: The Impact of OLE 2.0** What OLE can do for IS and How to Make Sure Your Favorite Desktop Software Vendor is Up to Speed *Buyers' Satisfaction Scorecard:* Leading OLE Applications *Firing Line:* Latest OLE Development Tool	**Windows World Comdex Spring** Atlanta, 5/23 - 5/26 **DB Expo** San Francisco, 5/24 - 5/27		
May 30	May 13	May 20	**Annual Job Satisfaction Survey** How IS Professionals and Managers Really Feel About Their Jobs and Careers			
June 6	May 20	May 27	**CW Guide To: Distributed DBMS** Selecting the Right Engine for a Distributed Database Architecture *Buyers' Satisfaction Scorecard:* Leading Relational DBMS *Firing Line:* Latest Relational DBMS Product	**Computerworld Smithsonian Awards** Washington, DC		Mails: June 8 Close: May 2
June 13	May 27	June 3	**Closer Look:** AS/400		Starch	
June 20	June 3	June 10	**CW Guide To: Mainframes** How Big Iron Vendors are Answering the Challenges of the Mainframe's Changing Role *Buyers' Satisfaction Scorecard:* Leading Mainframes from Amdahl, HDS, IBM, etc. *Firing Line:* Latest Mainframe Model			
June 27	June 10	June 17	**Closer Look:** PCMCIA Cards	**PC Expo** New York, NY, 6/28 - 6/30		

Editorial contacts (508) 879-0700 **CW Guide: The Guide includes a package of articles on the stated topic, in addition to Buyers' Scorecard and Firing Line**
Features Editor Joanne Kelleher, *Management Features:* Allan Alter, *Closer Look:* James Connolly, *CW Guide Articles:* Mary Brandel & Derek Slater, *Buyers' Satisfaction Scorecard:* Michael Sullivan-Trainor, *Firing Line:* Garry Ray
*Color close also applies to ads within Special Editorial Features and Premium Positions.

COMPUTERWORLD
BUYERS' SATISFACTION SCORECARD

Users want reliability in RISC servers, expansion not vital

By Kevin Burden

The most important quality RISC servers can deliver to companies downsizing from minicomputers is an equivalent level of reliability. That level of reliability is not entirely possible due to the differences in the operating systems. But the reliability they do deliver warranted high satisfaction ratings for each system featured.

One benefit RISC boxes do have over minicomputers is that they can be expanded easily. Users acknowledged this benefit, but, on the importance scale, they placed it behind all functions vital to the system's operating ability.

This Buyers' Satisfaction Scorecard is a user satisfaction survey of RISC systems from the market-leading RISC vendors. The purpose of the survey is to give an indication of the installed base's satisfaction with the systems' key features and functions.

In order to be selected for this Buyers' Scorecard, systems needed to have a sizable market presence. The random sample used was provided by a nonvendor source. The response base for each server family comprised high-end as well as low-end models to provide a satisfaction rating for the entire line.

Data General Corp's Aviion line tallied the highest overall satisfaction rating for the second straight year. The Aviion 5000 line along with DG's new AV 8500 RISC server were singled out this year. The three-model 5000 line uses the Motorola, Inc. 88100 processor, and the newer 8500 runs on the 88110 chip. The 5000 line provides a board-level upgrade path but only within the same system class.

Hewlett-Packard Co.'s HP 9000 Series 800 line is made up of 19 systems separated into four classes. The 10 and 20 models in each class are based on the firm's PA-RISC CPU. The 50, 60 and 70 servers incorporate HP's new PA-RISC 7100, which integrates the CPU with the floating-point coprocessing unit.

Included in Digital Equipment Corp.'s 4000 AXP line are four systems, two uniprocessor and two dual-processor. All are capable of supporting either OSF/1 AXP or OpenVMS AXP.

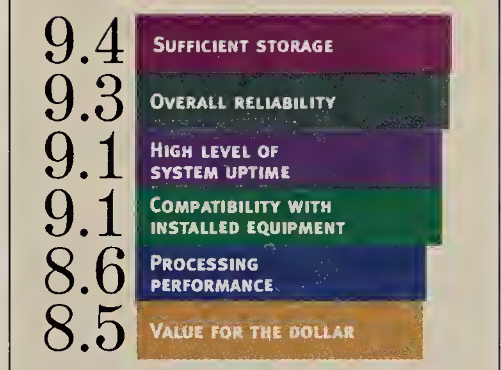
IBM's entry-level Powerserver 55L is based on IBM's Power Architecture. The top of the line 58H and 590 deskside systems introduced last October incorporate IBM's new eight-chip Power2 microprocessor. The Power2 nearly doubles both the integer and floating-point performance of the Power Architecture.

Sun Microsystems, Inc.'s SPARCserver 1000 line is available in either a single-, dual- or eight-processor configuration. ■

DATA GENERAL CORP. AVIION 5000 line and 8500

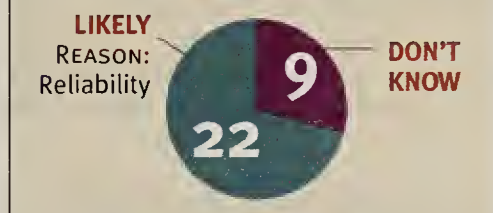
TOTAL SCORE 87

RESPONSE BASE: 31 USERS



Ratings are based on a 1-to-10 scale, where 10 is best.

Would you buy this product again?

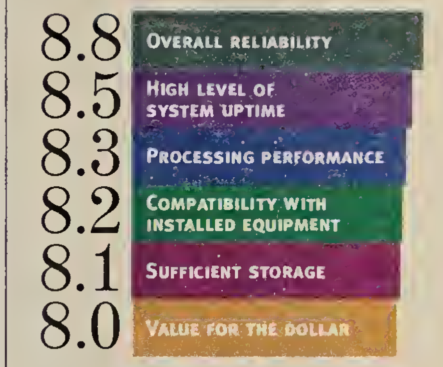


(Number of respondents)
Reasons are based on the most frequently stated answers.

HEWLETT-PACKARD CO. HP 9000 Series 800

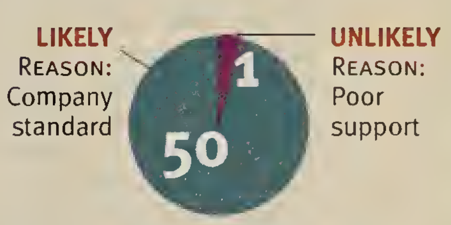
TOTAL SCORE 79

RESPONSE BASE: 51 USERS



Ratings are based on a 1-to-10 scale, where 10 is best.

Would you buy this product again?

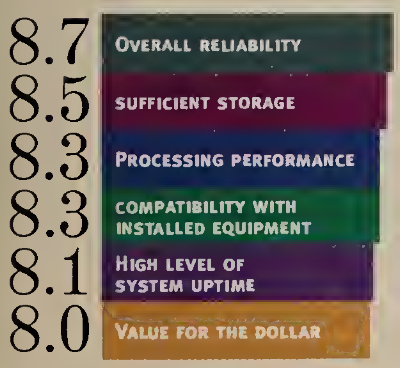


(Number of respondents)
Reasons are based on the most frequently stated answers.

DIGITAL EQUIPMENT CORP. DEC 4000 AXP

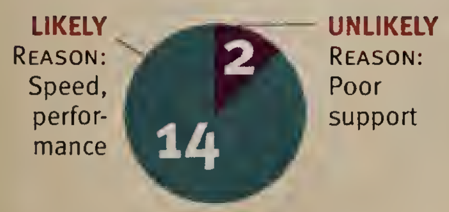
TOTAL SCORE 79

RESPONSE BASE: 16 USERS



Ratings are based on a 1-to-10 scale, where 10 is best.

Would you buy this product again?

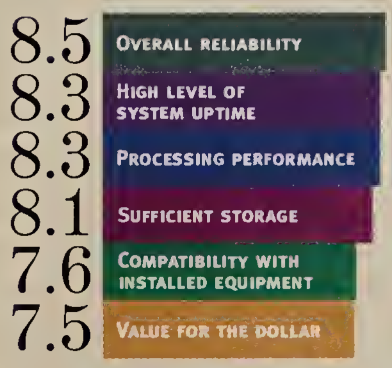


(Number of respondents)
Reasons are based on the most frequently stated answers.

IBM RS/6000 POWERSERVER 500 line

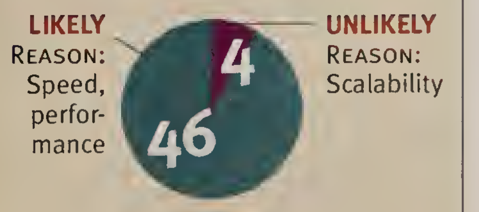
TOTAL SCORE 77

RESPONSE BASE: 50 USERS



Ratings are based on a 1-to-10 scale, where 10 is best.

Would you buy this product again?

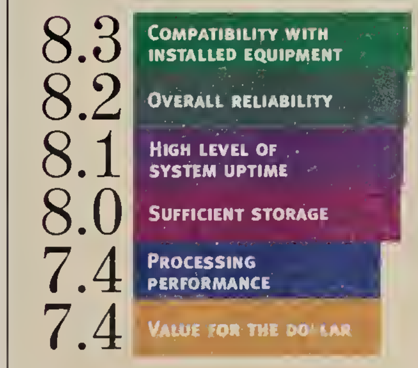


(Number of respondents)
Reasons are based on the most frequently stated answers.

SUN MICROSYSTEMS, INC. SPARCSERVER 1000

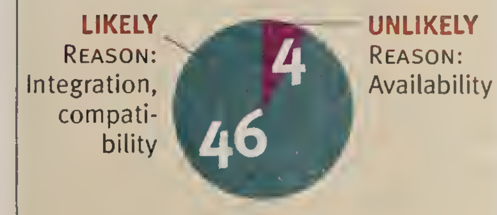
TOTAL SCORE 75

RESPONSE BASE: 50 USERS



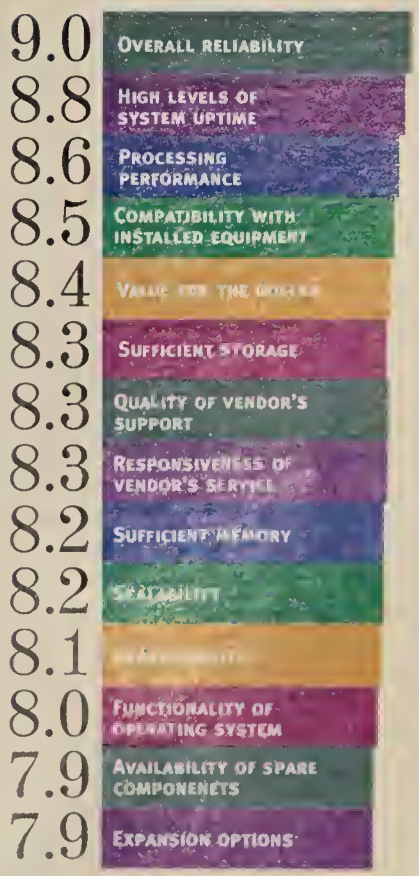
Ratings are based on a 1-to-10 scale, where 10 is best.

Would you buy this product again?



(Number of respondents)
Reasons are based on the most frequently stated answers.

RATINGS IN ORDER OF IMPORTANCE



Ratings are based on a 1-to-10 scale, where 10 is best.

Tricord superservers: Reliability, costs are hits with users

Powerframe ES 4000 and 5000

Computerworld's Firing Line is an evaluation based on interviews with major users at corporate and educational installations. The product under evaluation is being used in live application environments.

- The Tricord Systems, Inc. Powerframe ES 4000 and 5000 superservers won raves from users for reliability, disk performance, service and cost.
- Network performance and network support were consistent with industry norms, users agreed.

Administering and supporting multiple LAN servers is nobody's idea of fun. Immature net management tools, an imposing support burden and high costs make multiple servers first on everyone's "must ditch" list. Thus the rationale for superservers such as Tricord's Powerframe ES 4000 and 5000.

The $50,000 to $100,000 Powerframes, both released in 1993, are intended to consolidate multiple LAN servers into a single, maintainable box and at the same time improve overall throughput and performance.

A tall order? No doubt. But evaluators said the two superservers from the Plymouth, Minn., company are up to the task. The Powerframe ES series includes the reliability features typically associated with superservers: error-corrected circuitry memory; independent disk I/O subsystems with redundant arrays of inexpensive disks (RAID) Levels 0 through 5 and hot-swappable SCSI devices; redundant power supplies; and extensive problem diagnostics.

Evaluators for this survey included technical and management personnel from a building materials firm, a mortgage company, a retailer and a systems integrator.

Reliability

Evaluators spoke highly of the Powerframe features that provide redundancy and fault tolerance. They said the ES 4000 and 5000 delivered excellent reliability.

Mortgage company: "We have had one disk failure. We were notified in the middle of the night that the Integrated Management Services [software] had hot-swapped the drive."

Network support

The Powerframe ES 4000 and 5000 run virtually every major network operating system, according to the evaluators.

Integrator: "It runs Novell NetWare, Univel Unix, SCO Unix, Windows NT Advanced Server and OS/2."

Processor performance

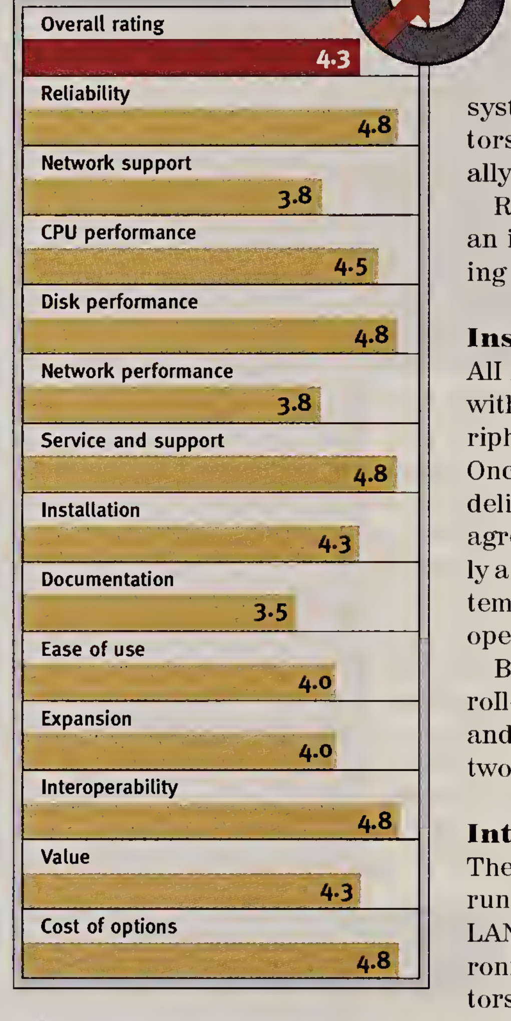
The ES 4000 and ES 5000 support up to six Intel Corp. 486 or Pentium processors connected to a 64-bit bus. Processors are relieved of significant I/O processing by Tricord's Intelligent Storage Subsystem (ISS), which provides up to six independent 386 processors to manage disk and memory I/O.

Integrator: "These are racehorses of the first magnitude."

Mortgage company: After an upgrade to the ES 5000, "We found that responsiveness increased dramatically. Our processor utilization is in the 20% to 30% range."

Tricord's Powerframe ES superservers

Ratings are based on user expectations on a 1-to-5 scale, where 1 is below expectations and 5 is above expectations. Ratings are presented in order of importance to users.



Disk performance

Although the Powerframe supports standard, off-the-shelf SCSI drives, evaluators concurred that the Powerframe ISS provides outstanding disk performance.

Network performance

The evaluators said that network performance was largely dependent on factors not attributable to the Powerframe. They said performance met their expectations.

Service and support

Tricord sells and supports the Powerframe through a network of consultants and systems integrators. The evaluators said that support was generally above their expectations.

Retailer: "We get support from an integrator that we've been using for years."

Installation

All Powerframes were configured with disks, memory and other peripherals by Tricord resellers. Once completed, the systems were delivered to the evaluators, who agreed that installation was largely a matter of powering up the system and configuring the network operating system.

Building materials firm: "We rolled it in, connected it to the hub and were done. We had it going in two hours."

Interoperability

The evaluators had no difficulty running Powerframes in mixed LAN and wide-area network environments. Among the four evaluators, the systems were run in Fiber Distributed Data Interface, Token Ring, Ethernet, T1 and Arcnet environments. None of these configurations posed special problems.

Value

Evaluators rated value as better than average primarily because of high performance and the moderate cost of expansion options.

Building materials firm: "Other vendors had configuration options that were all more expensive than the ES 4000."

Retailer: "The amount we paid was less than going to the competition."

Cost of options

Evaluators said that most options were reasonably priced because the Powerframe used industry-standard components.

Retailer: "There is no proprietary stuff in the box."

Integrator: "The RAM is a proprietary [single in-line memory module], but it is high grade."

Written by Computerworld *senior editor Garry Ray.*

Tricord responds

Tricord Vice President of Corporate Strategy Mark Garver responded to issues raised in this evaluation.

▶ **ES 4000 vs. ES 5000:** The [two systems] are electrically the same. The difference is scalability. Customers can start with the base ES 4000 unit with less capability for disk storage. Also optional on the ES 4000 are the Intelligent Management Subsystem, hot-swap disk drives and most of the high-availability features of the ES 5000. The ES 4000 has the same RAID and redundancy features of the ES 5000.

▶ **Applications:** We see the ES 4000 as a departmental application server, while the ES 5000 is a corporate or enterprise server. However, some customers have used our Powerframe Model 40 as a departmental application server and the ES 4000 as a corporate data server. Since users will get the same performance from the ES 4000 and ES 5000, some firms are using the ES 4000 as an application development machine.

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SOUND OFF!

AT ISSUE: The fight is on between IBM and Microsoft in IS shops. Our pro-IBM user claims IBM is poised for the future with the one-two-three punch of OS/2, Workplace OS and Taligent. His opponent says IBM has nothing to offer but hot air and heartache. Microsoft gives you scalability.

OS/2 VS.

BY ROBERT D. HOLMES

About the only thing Microsoft Corp. has going for it is the Windows brand name. When it comes to a long-term strategy with which corporate information systems and users can live, give me IBM's OS/2 (and Workplace OS and Taligent) every time.

When you compare OS/2 2.1 and Windows NT 3.1 hardware requirements, OS/2 comes out on top. You pay a price for NT's portability. It needs more memory.

"Portability," critics say, "helps Microsoft beat the pants off OS/2." Poppycock. IBM's strategy includes portability, and don't let any Microsoft booster tell you otherwise.

Workplace OS will support multiple personalities, including the OS/2 2.1 application programming interface (API) and AIX API. It can adapt to run on a wide variety of hardware, such as the PowerPC, and uses the Workplace Shell as its user interface. Support for the OS/2 2.1 API and a consistent interface will make migration between OS/2 and Workplace/OS trauma-free.

The user interface will be identical compared with the hodgepodge offered by Microsoft's Windows 3.1, Chicago and Cairo. More importantly, the API set will be identical. So full-screen applications and presentation managers written for OS/2 1.0 will work on 2.0 and 2.1.

Contrast this cohesiveness with what appears to be Microsoft's casual throwing of API sets against the wall to see which will stick. Microsoft offers the confusing choice of Win32 (the 32-bit API set for NT 3.1), Win32s (for Windows 3.1) and Win32c (for Chicago).

Crystal ball gazing

IBM is plugged in to the future. It delivers state-of-the-art object orientation today and provides a clear path to the total object orientation of Taligent.

For example, IBM has founded the Workplace Shell on the System Object Model (SOM), the first implementation of the Object Management Group's (OMG) Common Object Request Broker Architecture (CORBA). SOM goes beyond CORBA and is language-neutral. This allows objects created in a language such as C++ to be accessed and subclassed by programs written in another language or compiled by a different C++ compiler that supports SOM. I'm talking about product delivery, not rhetoric.

Let's face it. The future of programming means object orientation. Going with IBM's strategy provides IS shops with a leadership position in that area.

And going with IBM can also guarantee a leadership position in the hot area of client/server architectures. That's because it offers an operating environment that treats a set of LAN resources as a seamless entity. It does so through the Distributed Computing Environment (DCE) and Distributed Systems Object Model (DSOM), both of which are available for OS/2. An application can use DCE and DSOM to take advantage of a heterogeneous environment that can incorporate hardware running OS/2, AIX and other Unix variants.

So, for instance, you could start out with a DCE-based application on Intel hardware using OS/2 but find out you need more server

Robert Holmes, *page 130*

▶**ROBERT D. HOLMES:** *IBM's the client/server, object-oriented leader*

WINDOWS NT

BY MICHAEL DRIPS

When you buy into IBM's OS/2 world, you're buying into a losing proposition.

I believe that with its initial release of Windows NT, Microsoft Corp. has given computer professionals a scalable platform for enterprisewide computing.

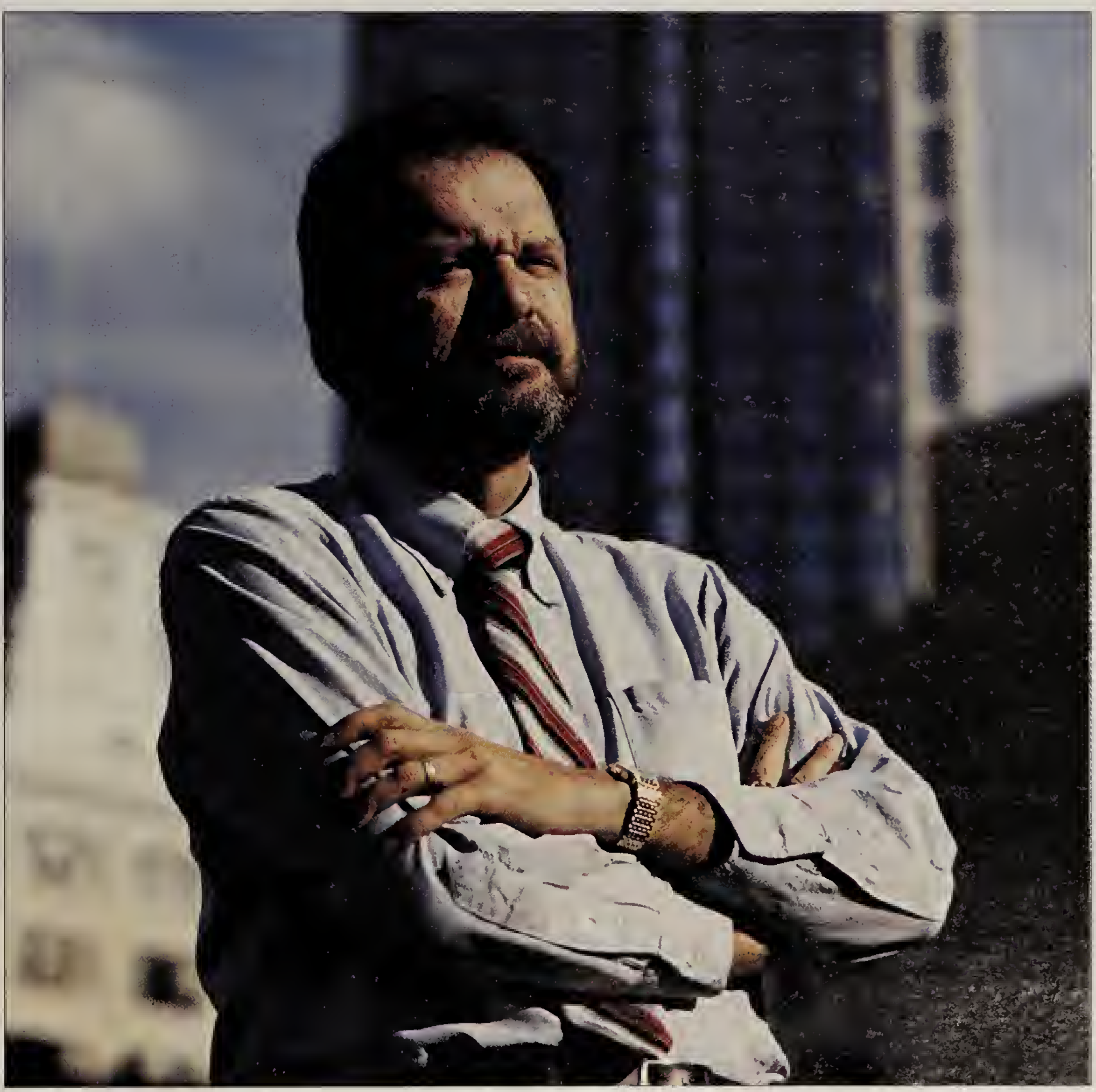
While IBM flounders around with shotgun marriages to Apple Computer, Inc. and Novell, Inc., Microsoft has moved forward with an operating system that can carry any enterprise into the next century.

After six releases of OS/2, IBM keeps attempting to capture mind share with its "better DOS than DOS, better Windows than Windows" strategy rather than capturing market share with an operating system that would make sense in today's competitive global market.

IBM has fallen back on its old tactic of promising that, someday, a golden future will arrive.

But that future is a little shaky if IBM's partnerships are any indication. It has paired with Apple to develop a futuristic operating system, but Apple is struggling to figure out its own strategic direction. IBM also has an agreement with Novell, which, while it has a large market share, is locked into a 1980s technology that is inherently incapable of meeting the networking requirements of the 1990s.

Microsoft's networking approach is much more sensible than IBM and Novell's kludgy offering. Peer-to-peer networking is built into the basic Windows NT package.



▶ **MICHAEL DRIPS:** *Microsoft's networking and scalability are pluses*

ROBBIE RODGERS

For wide-area and international enterprise networking, there is Windows NT Advanced Server. Windows NT SNA Server provides both IBM and non-IBM X.25 connectivity to legacy midrange and mainframe systems. Windows NT SQL Server provides a re-engineered and more robust version of the Sybase, Inc. relational database for networks.

The networking portion of Windows NT supports Macintosh, MS-DOS, Windows, Windows NT and OS/2 clients. Scalability from Intel processors through RISC processors as well as symmetrical multiprocessing support sets Windows NT apart from the hodgepodge solutions of lesser competitors, namely Novell and IBM.

The point is that Windows NT was engineered from the ground up to unite computer operating systems with network operating systems. This unification of operating systems is a logical step in the evolution of enterprise computing. Implementing Windows NT at the workstation level eliminates the expense and headache of configuring different network and computer operating systems.

And the beauty of it all is that Windows users can perform productive work from Day 1. That's because the details of using the environment are practically the same under Windows NT as under Windows 3.1 or Windows for Workgroups.

Windows NT supports MS-DOS, Windows, Posix, OS/2, and of course, Windows NT applications. While there are currently few Windows NT applications available, most of today's Windows vendors have announced their commitment to developing Windows NT versions of their products.

Conversely, where are the OS/2 applications? Companies such as Aldus Corp., Micrografx, Inc. and WordPerfect Corp. have dropped out of the minuscule and unprofitable OS/2 market. With the exception of Lotus Development

Michael Drips, *page 130*

SOUNDOFF!

Robert Holmes

CONTINUED FROM PAGE 128

horsepower to scale up the application. You choose a Hewlett-Packard Co. HP 9000. With DCE, to incorporate the box in your network as a server, all you have to do is take a portion of your application and recompile it to run on that box.

IBM is delivering the environment that can make client/server architectures successful. Microsoft is only talking about it.

People might claim 'Windows is the de facto strategic direction of corporate IS," but that's no reason to buy a product. Once-glorious de facto strategies litter the computing landscape. Being the leader in a 16-bit world doesn't gain you much in a 32-bit universe. The microprocessor universe has been 32-bit for several years. And 32-bit means OS/2.

I want to pick a strategy that fits my view of where the world and my company are headed. I want to be sure that the company behind the strategy will provide me with the support I need. I do not want to find myself in the position of Microsoft users who chose OS/2 and were abandoned by Microsoft.

IBM is delivering on object orientation for user interfaces and application development. It will enable users to move easily to Workplace OS and Taligent. I believe Microsoft offers little more than the comfort of the Windows brand name and a wide-ranging set of promises. ■

Holmes is a technical consultant for Southern California Gas Co. in Los Angeles.

Michael Drips

CONTINUED FROM PAGE 129

Corp.'s SmartSuite, companies committed to OS/2 are being forced to develop their own applications or else fall back on running MS-DOS and Windows applications under OS/2.

Unlike IBM's promises for the future, Microsoft rapidly delivers on its promises of new technology. In the middle of 1993, Microsoft introduced Windows at Work, a framework for linking desktop computers with fax, phone systems and copiers. Phone, fax and copier makers are already shipping products that will interface with Windows at Work. By the end of 1993, Windows at Work Version 1.0 had been incorporated into Windows for Workgroups. It is probable that this technology will be rolled into the mid-1994 release of Windows NT.

Microsoft has a plan for the future . . . in contrast, OS/2 is the zombie operating environment of the 1990s.

Microsoft has a plan for the future. The 16-bit Windows versions will be replaced later this year by the 32-bit Windows 4.0, while NT will get a mid-year upgrade to address resource and performance issues. In 1995, NT will get a more robust object-oriented interface. Best of all, today's Windows applications will still be capable of running under the Windows operating environment through 1995.

In contrast, OS/2 is the zombie operating environment of the 1990s. It's dead, but IBM won't admit it even though it is set to replace OS/2 with Taligent by 1995.

IBM reacts to the '90s by delivering tools from the '80s. The downsizing of DB2 and CICS to OS/2 is a typical IBM response to the momentum of client/server implementation in today's corporations. The only thing using DB2 and CICS at the PC level does is give IBM shops a warm, fuzzy level of comfort. These shops are not using PCs as productive workstations but as expensive dumb terminals.

I ask myself constantly, "What environment best fulfills my company's requirements for today's market and the market of the future?" For me that answer is an environment based on Microsoft's Windows NT. ■

Drips is a Windows consultant working under contract at a large firm in Florida.

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E-mail-enabled

Administration duties are product-specific and can easily be picked up through vendor training. Higher-level management skills, although growing in importance, require a significant commitment.

By Joe Panepinto

The management of large, far-flung electronic-mail systems is growing beyond the expertise of already-harried LAN administrators, many of whom inherited the new tasks as a matter of course.

LAN managers' shoulders were the most logical place to dump this responsibility. However, the required knowledge is growing beyond the reach of those picking up the skills as a sideline.

"LAN administrators tacked E-mail duties onto their job descriptions," says Nina Burns, president of Creative Networks, a research and consulting firm in San Francisco. "Now there is a push to tie all E-mail together, and the management of it is becoming more centralized."

Burns makes a distinction between administration and management. Administration of an E-mail package, such as Lotus Development Corp.'s CC:Mail, includes duties such as adding and deleting users from the address book, managing distribution lists and generating statistical reports. It is often done by LAN managers, but power users also take the reins.

Management includes higher-level functions such as planning for systems integration and managing groups of post offices or address books. It is typically tackled by network personnel not only versed in LANs, but armed with backbone (X.400), NetWare Message Handling Service and directory (X.500) skills.

Generally, administration skills are package-specific and require a small amount of vendor training and extensive documentation use. Management skills, however, involve understanding the physical transport of the network packets, the design of message flows and an understanding of naming conventions, says David Ferris, president of Ferris Networks, an E-mail research and consulting firm in San Francisco. Rarely are the skills found in a single person. "Once you get above a few hundred users, LAN managers or clerical people managing lists quickly get in over their heads," Ferris says.

Even with E-mail systems on mainframes or minicomputers, the division of local administration and centralized management remains valid. Linda Parker, E-mail manager at Rohm & Haas Co. in Houston, administers an OfficeVision E-mail system for 1,300 users on an IBM AS/400. As chief security officer, Parker makes sure users are enrolled and have the level of authority to use shared files.

"I spent a good deal of time learning by doing," Parker says. She estimates she worked full time for a year learning the system. Now, she spends perhaps 5% of her day administering it. Systems management, which includes integration of the OfficeVision users with those using CC:Mail on PC LANs and IBM's Profs on the mainframe, falls to a group in centralized information systems.

Roger Mizumori, manager of the messaging service planning department at The Boeing Co., is not responsible for day-to-day E-mail administration. Instead, Mizumori manages the planning and establishment of Boeing's X.400 backbone and represents Boeing on standards boards for integrating the various messaging media types.

"We don't have a single person in charge of messaging," Mizumori says. "We have a decentralized organization with a central backbone that is managed centrally."

The centralized IS functions include management of external X.400 gateways and Boeing's directory service. LAN administrators handle account setup, maintenance and training.

While the role of the local administrator is not likely to change soon, some analysts see movement afoot that may increase the importance of centralized electronic-messaging management.

As E-mail use grows and begins to form the backbone whereby a variety of computing services are integrated, the need for E-mail servers and full-time managers will begin to emerge, says Stan Schatt, service director of LAN services at Computer Intelligence/InfoCorp in Santa Clara, Calif.

"We're going to see an increase in the number of E-mail servers," Schatt says. "This is becoming more important because of the effect electronic messaging has on the entire computing environment."

E-mail explosion

83%	Growth in number of sites using E-mail from 1991 (94,000 sites) to 1993 (180,000 sites).
90%	Percentage of sites with more than 1,000 employees using E-mail.
19%	Annual growth rate of E-mail users; up from 17%.

Source: Electronic Messaging Association, Arlington, Va.

Panepinto is a free-lance writer in Amherst, Mass.

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Take control of Visual Basic

By Keith R. Pleas

Microsoft Corp.'s Visual Basic is almost too easy to learn. Place a few controls on a form, change a few properties, double click on a control to open a window, add a few lines of Basic code and hit <F5> to run, and it looks like you've got an application.

In truth, you've only just got something to start with. Making incremental changes and immediately seeing the effect is nice, but nontrivial applications require some effort.

Who are you?

If you are a Windows-based C programmer, you'll find that Visual Basic requires an adjustment in thinking. It has actual strings (without null string termination), lacks pointers, compiles to threaded P-code and has interactive development and debugging. Visual Basic code is also much more straightforward and maintainable than the write-once code in other lower-level languages.

If you are a database administrator looking for a new challenge, Visual Basic's data-access capabilities will be familiar. However, you'll have to learn event-driven programming and the whole forms and control model on which Visual Basic is based.

For Windows programming, an understanding of Windows' messaging and event-driven architecture will help you visualize behind-the-scenes events. For this reason, programmers with traditional Windows C or C++ backgrounds have a substantial advantage.

If you've never developed in Windows, however, you have a big climb.

But whatever you program in, understanding the environment from a user perspective is mandatory if you want people to be able to actually use your program.

Professional development

There is no specific formula for learning Visual Basic, so start with an application in mind. Ideally, it should solve a real problem, but solving someone else's problem is even better.

Visual Basic programs can encompass programming algorithms, user interface design, data access, integration with external applications through Dynamic Data Exchange and Object Linking and Embedding and direct access of Windows and other Dynamic Link Libraries (DLL).

Fortunately, Visual Basic handles much of this. Many useful code samples are included, but it lacks a road map and the samples have virtually no in-line comments.

Windows programmers will find Visual Basic's printed and on-line documentation complete and useful. The on-line help file frequently contains code snippets that can be copied and pasted into an application, although you must change things such as default form and control names to match those in your application.

Safety nets

Visual Basic's error handling offers a decent safety net. It is almost impossible to lock up Windows if you don't use DLL calls directly. But do not expect your programs to suddenly become more robust. Its debugging environment is also helpful. Because Visual Basic code is threaded P-code, it is possible to make runtime modifications to variables and code without recompiling.

The wise programmer will take advantage of this feature.

Unfortunately, there are no industry standards for Visual Basic coding guidelines so you may want to investigate those used by Microsoft Consulting Services (available on the Microsoft Developer Network CD-ROM).

Above all, keep your coding style consistent, keep your manuals handy and get in touch with other Visual Basic programmers.

Pleas is an independent developer and contributing editor to *Visual Basic Programmer's Journal*. He can be reached on the Internet at keithp@eurlew.wa.com or via CompuServe at 72331,2150.

5 Pitfalls

THE MOST OBVIOUS PROBLEMS FOR FIRST-TIME VISUAL BASIC PROGRAMMERS INVOLVE USER-INTERFACE DESIGN. AVOID THE FOLLOWING SITUATIONS:

1. GRUNGE DESIGN: Visual Basic makes it easy to specify things such as font, color and size. Programmers can get carried away with so many options and wind up with screens that resemble ransom notes.

2. CONTROL OVERLOAD: Visual Basic makes it so easy to place controls on a form that this often (wrongly) takes the place of any true effort at application design.

3. FORM OVERLOAD: When an application has many forms that are only slightly different, it consumes valuable resources and makes your application slow and difficult to maintain. Investigate using dynamic form arrays.

4. GRATUITOUS USE OF THREE-DIMENSIONAL EFFECTS: Building 3-D buttons on 3-D frames on 3-D elements is overkill. Restrict your application to one elevated and one sunken dimensional plane.

5. DESIGN TIME: One of Visual Basic's more seductive features is that it lets you set control properties in the design-time environment. Doing so, however, tends to make the application undocumentable. It also prohibits you from searching and replacing and makes it harder to reuse pieces from an application.

Finding help:

- MsBasic forum (CompuServe): official Microsoft support
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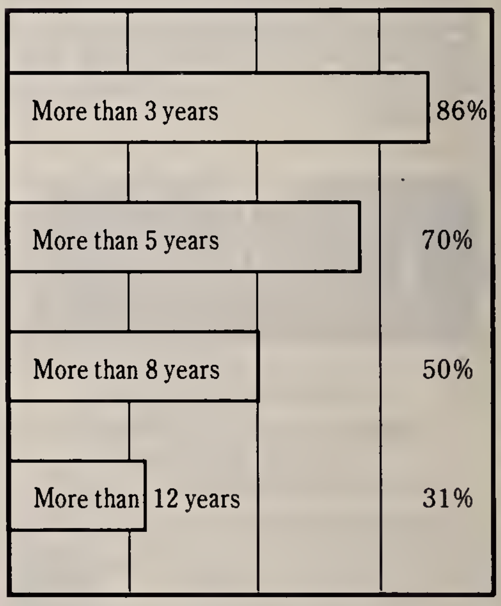

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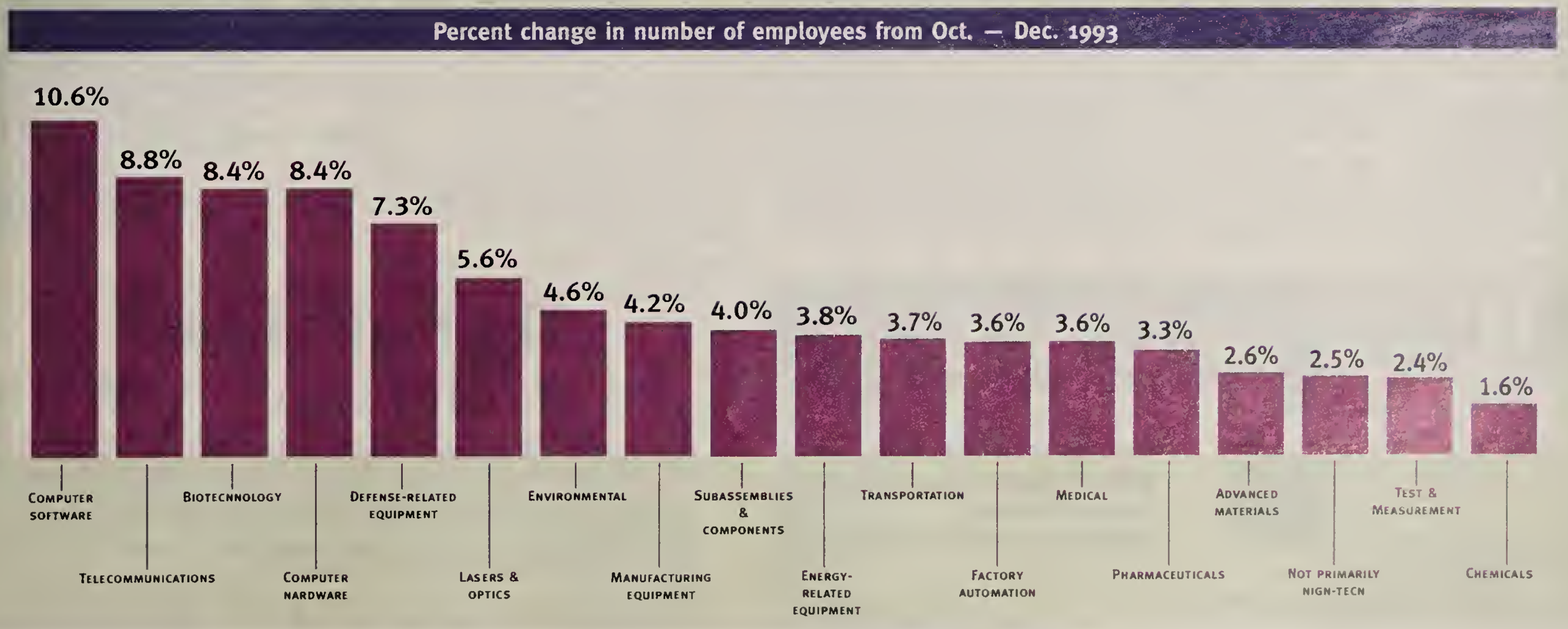

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NIP and TUCK

You can't replace your notebook computers every time a new feature is added, but you can get better mileage from older models with a few extra steps

BY LESLIE GOFF

A few simple diagnostic and maintenance routines can prolong the life of a notebook computer, but users are likely to demand new ones with extra bells and whistles before the old ones wear out.

More important than prolonging a notebook's life is giving users the tools that enable them to get optimal performance from their current machines until they upgrade to a better model.

The average notebook is built to last five to seven years, according to Bruce Stephen, director of PC hardware research at International Data Corp. in Framingham, Mass. But people are turning models over sooner, "depending on whether they're paying for [them] themselves," he says.

Matthew Cain, program director for the Workgroup Computing Strategies Service at Meta Group, Inc. in Westport, Conn., estimates the turnover rate to be about every three years. Users are upgrading to get active-matrix color displays or PCMCIA card slots or to migrate to Windows.

"Lots of laptops are being retired because they didn't have the processing power, memory configuration or hard-disk space to support Windows and Windows applications," Cain says.

PCMCIA slots accept credit card-size boards that enable users to add solid-state memory, fax modem capability and other functionality that "gives you a huge amount of autonomy," he adds.

Information systems departments that want their laptops to outlast the upgrade curve should closely monitor laptops' condition, particularly models that are checked out on a regular basis, notes Stephen Rood, information services director at Goodtimes Home Video Corp. in New York.

"If you don't make a concerted effort to clean up your laptops, eventually you'll find parts missing, keys broken, the floppy drive not working," he says.

Rood says he used an asset-tracking software program when he worked at Coopers & Lybrand in New York to manage an inventory of 40 rotating and 100 permanently assigned laptops. Each time a machine came back from the field he ran a virus check, cleaned the case and screen and checked and cleaned the hard and floppy drives. Rood used Touchstone Software Corp.'s Check It Pro: System Info, which "gives a quick reading of what the system is, the base memory, the switches, the external memory, the memory's performance and good overall system information."

"A conscious maintenance effort will extend the life of the machine because you can immediately pull a model out of service and repair it before the problem gets worse," Rood adds.

The most "delicate and vulnerable" parts of the laptop, and those most likely to have problems, are the screen and the hard drive, warns Stephen Bigelow at Dynamic Learning Systems, a Marlboro, Mass., technical research firm. Bigelow is the author of *Maintain and Repair Your Notebook, Palmtop or Pen Computer* (Windcrest/McGraw-Hill, 1993).

The screen is a potential problem because it contains thousands of transistors, and "you have liquid crystal material wedged between two pieces of glass, and the surface is generally a light polarizer," Bigelow says. "If you scratch a polarizing surface, it ruins the screen."

Moreover, Bigelow says users should keep laptops out of temperatures below 40 degrees Farenheit because the liquid crystal "tends to coagulate. Once that happens it will form bubbles under the screen that never go away."

Hard drives are also sensitive, Bigelow says, because they are electro-mechanical devices and consume a lot of power. He recommends that users who keep laptops turned on for long periods of time use a disk saver. IS departments should also defragment the hard drive on a regular basis. Because files are not stored contiguously, the drive spins more when searching for each piece of a file. "That's extra wear and tear," Bigelow says.

Finally, experts say don't underestimate the value of a good carrying case, which can help extend the life of a notebook.

"While a portable is more tolerant of shock than a desktop machine, placing it down hard or dropping it isn't good," Bigelow says. "Users have to be sensitive that it's still a delicate mechanism."

MAINTENANCE TIPS

- Never use water to clean the display.
- Keep battery connectors and terminals clean and dry.
- Defragment hard drive when it reaches 10% defragmentation.
- Clean the floppy drive at least once every six months, more often if users are formatting and copying to or from floppy disks.
- Use a cleaning pad mounted in a floppy case to clean the heads, or clean them manually with cotton swabs dipped in isopropyl alcohol.
- Use floppy drive alignment software to measure and align the drive rather than replace it.
- Use an oscilloscope to measure activity on the buses, check the internal clock and measure power supply voltages.

Sources: Stephen Bigelow, Dynamic Learning Systems, and Stephen Rood, Goodtimes Home Video Corp., New York

PREVENT UPGRADE-ITIS

Software that may squelch a user's need for a new notebook:

- Software that consolidates and eases file transfer from the notebook to the desktop machine.
- Software that updates and maintains file integrity across both machines.
- A base set of personal information software, such as a calendar, address book and data manager.
- Hard-disk compression software that increases the available space on a hard disk.
- Port replicators that allow users to add ports for hooking up additional peripherals.

Source: International Data Corp., Framingham, Mass.

Goff is a free-lance writer in New York.

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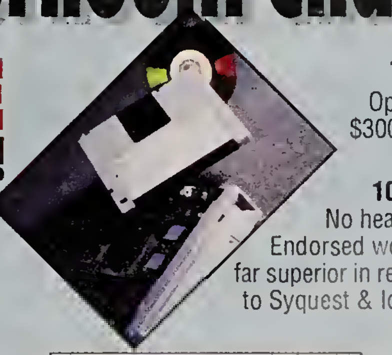

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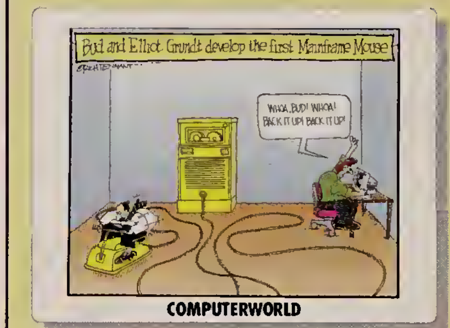
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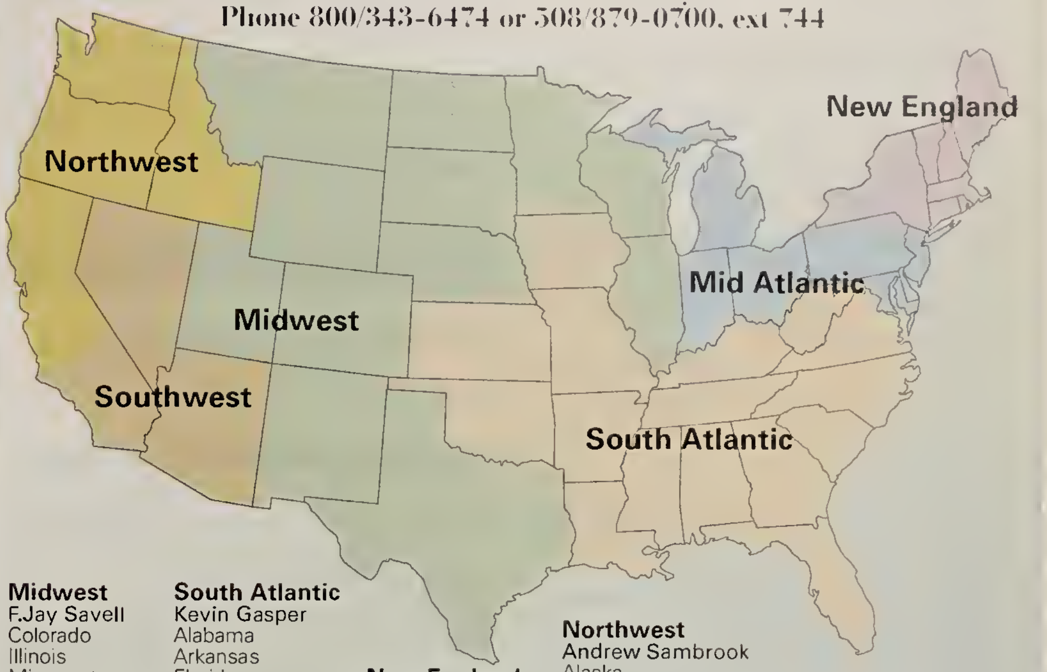

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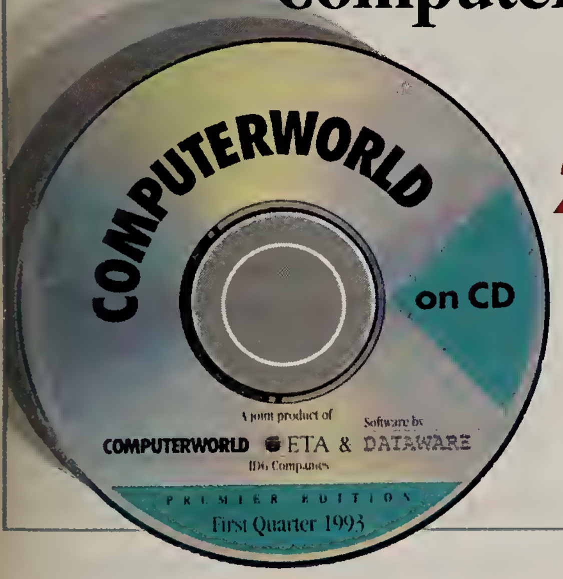

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Friday Stock Ticker

Gainers Losers

Percent

Gainers		Losers	
Inacom Corp.	27.0	Software Spectrum Inc.	-24.7
Netrix Corp.	22.7	Ross Systems(L)	-23.1
Sequoia Systems Inc.	20.3	Scientific Atlanta Inc.	-20.1
Easel Corp.	20.0	Chips and Technologies	-17.9
Rasterops	17.9	Group I Software	-15.9
Cray Research Inc.	17.8	Ask Computer Systems(L)	-14.1
Platinum Software	16.3	CrossComm	-13.8
Cheyenne Software Inc.	14.8	Dell Computer Corp.	-13.1

Dollar

Gainers		Losers	
Matsushita Electronics(H)	9.50	DSC Communications	-7.88
Autodesk Inc.	5.50	Scientific Atlanta Inc.	-6.75
Cheyenne Software Inc.	4.75	Software Spectrum Inc.	-5.75
Cray Research Inc.	4.75	3M Corp	-4.50
Bellsouth Corp.	4.00	Chipcom Corp.(H)	-3.75
Powersoft(H)	3.88	Dell Computer Corp.	-3.25
Inacom Corp.	3.88	CrossComm	-3.25
3 COM Corp.	3.25	Creative Technologies Inc.(H)	-2.25

Cheyenne Software, Inc. announced last week that one of its products will be bundled with Novell, Inc.'s AppWare. Wang Laboratories, Inc. rose on news of a profitable quarter, while Software Spectrum, Inc. reported decreasing profit margins.

Industry Almanac

No, it isn't a law firm

Bolt, Beranek and Newman, Inc.'s (BBN) stock is up — way up. It has climbed nearly 200% since the beginning of 1993. That might be a little surprising for a firm that has lost money in three of the last five fiscal years.

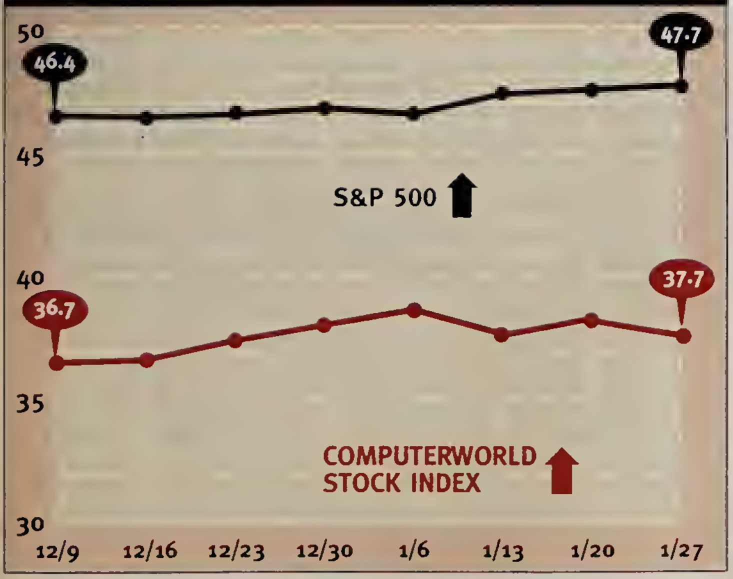
Bolt, Beranek develops networking products and provides integration services. Until recently, it also manufactured computer and networking equipment. In 1993, the company lost more than $32 million on revenue of about $233 million.

The Cambridge, Mass., company has made a number of changes to stanch the flow. Business lines and products have been cut or consolidated, and though Bolt, Beranek will continue to develop new technologies, it will depend on others to handle the manufacturing. And Bolt, Beranek recently named **IBM** veteran George Conrades to its top post.

Lee Allen, president of Allen Financial Advisors in Boston, said those steps have combined to drive Bolt, Beranek's rising share price. "With [Bolt, Beranek's] restructuring, analysts are expecting them to do a better job of targeting the commercial marketplace," he said.

Allen said the stock can grow further if new products such as an Asynchronous Transfer Mode (ATM) switch prove successful. Bolt, Beranek has set up a joint venture with **Tandem Computers, Inc.** (TNDM) subsidiary Ungermann-Bass to develop and sell ATM products. —*Derek Slater*

STOCK TRADING INDEX



Communications and Network Services — UP 0.07%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
OTC	54.13	19.63	3 COM Corp.	54.13	3.25	6.4
NYS	45.56	35.50	AMERITECH Corp. (L)	40.75	2.25	5.8
NYS	65.00	51.63	AT&T	56.75	0.88	1.6
OTC	4.44	1.72	Artel Communication Corp.	3.56	-0.13	-3.4
OTC	26.50	12.50	Banyan Systems Inc.	15.00	0.13	0.8
NYS	69.13	50.75	Bell Atlantic Corp.	57.13	1.25	2.2
NYS	63.88	50.63	Bellsouth Corp.	60.50	4.00	7.1
NYS	16.75	4.25	Bolt, Beranek & Newman (H)	16.13	0.25	1.6
OTC	18.50	9.50	Brooktrout Technology	14.50	-0.25	-1.7
NYS	122.38	74.50	Cabletron Systems (H)	119.88	0.00	0.0
OTC	36.50	11.25	Centigram Communications	33.75	-1.13	-3.2
OTC	57.00	26.50	Chipcom Corp. (H)	52.50	-3.75	-6.7
OTC	71.25	38.50	Cisco Systems Inc. (H)	70.38	1.25	1.8
OTC	18.38	8.00	Compression Labs Inc.	13.88	-0.88	-5.9
OTC	36.00	20.00	CrossComm	20.25	-3.25	-13.8
OTC	4.63	1.50	Data Switch Corp.	2.50	0.00	0.0
OTC	9.75	3.31	Digital Systems Int'l Inc.	3.88	0.00	0.0
OTC	73.13	20.88	DSC Communications	58.25	-7.88	-11.9
OTC	9.50	4.00	Fibronix Int'l Inc.	4.75	0.00	0.0
OTC	4.25	1.44	Gandalf Technologies Inc. (L)	1.75	-0.19	-9.7
OTC	2.06	0.69	Gateway Communications	1.00	0.06	6.6
NYS	15.75	7.50	General Datacomm Inds.	11.88	0.88	8.0
ASE	3.50	2.00	Go Video	2.63	-0.19	-6.7
NYS	39.88	33.25	GTE Corp.	34.50	-0.13	-0.4
NYS	97.63	71.75	ITT Corp. (H)	96.63	1.25	1.3
OTC	29.88	18.81	MCI Commmunications Corp.	27.63	0.13	0.5
OTC	6.13	1.50	Microcom Inc.	5.88	0.63	11.9
OTC	23.25	3.50	Netrix Corp.	6.75	1.25	22.7
OTC	19.00	6.00	Network Computing Devices (L)	6.75	-0.75	-10.0
NYS	11.13	5.38	Network Equipment Tech.	9.38	0.38	4.2
OTC	19.25	8.00	Network General (H)	19.25	0.63	3.4
OTC	12.63	6.88	Network Systems Corp.	9.13	-0.13	-1.4
OTC	73.88	20.19	Newbridge Networks Corp.	66.63	1.75	2.7
NYS	46.00	21.38	Northern Telecom Ltd.	31.25	-1.38	-4.2
OTC	35.25	17.00	Novell Inc.	21.88	-1.00	-4.4
NYS	48.88	38.38	Nynex Corp.	40.63	1.00	2.5
OTC	28.75	19.00	Octel Communications Corp.	28.00	3.00	12.0
OTC	22.00	8.75	Optical Data Systems Inc.	11.75	-1.25	-9.6
OTC	6.75	3.75	Penril Data Comm Networks	6.75	0.75	12.5
OTC	27.75	14.50	Picturetel Corp.	18.50	0.13	0.7
OTC	10.75	3.63	Proteon Inc.	6.13	-0.50	-7.5
NYS	38.88	17.75	Scientific Atlanta Inc.	26.88	-6.75	-20.1
NYS	47.00	34.19	Southwestern Bell Corp.	41.00	0.88	2.2
NYS	40.25	26.50	Sprint Corp.	35.88	-0.13	-0.3
OTC	26.75	12.50	Standard Microsystems Corp.	21.13	-1.38	-6.1
OTC	19.75	10.25	Stratacom Inc.	16.25	-0.75	-4.4
OTC	42.75	20.00	Synoptics Communications	29.25	1.50	5.4
OTC	9.88	2.88	Telebit Corp.	8.81	0.44	5.2
OTC	37.00	17.00	US Robotics (H)	35.75	0.75	2.1
NYS	50.75	38.50	U S West Inc.	44.50	0.88	2.0
OTC	72.38	29.50	Wellfleet Communications	72.38	3.13	4.5
OTC	20.50	7.25	Xircom	19.50	0.25	1.3
OTC	30.00	15.25	Xyplex Inc.	19.75	-0.75	-3.7

PCs and Workstations — OFF 0.48%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
OTC	5.56	2.50	Advanced Logic Research	4.13	-0.50	-10.8
OTC	61.50	22.00	Apple Computer Inc.	34.25	1.50	4.6
OTC	30.63	12.75	AST Research Inc. (H)	30.63	1.88	6.5
NYS	6.75	2.50	Commodore Int'l	3.13	-0.13	-3.8
NYS	84.63	41.75	Compaq Computer Corp. (H)	83.50	1.50	1.8
OTC	49.13	13.50	Dell Computer Corp.	21.63	-3.25	-13.1
OTC	23.50	16.75	Gateway 2000 Inc. (H)	23.50	1.00	4.4
NYS	89.25	64.38	Hewlett Packard Co.	84.13	-0.38	-0.4
NYS	26.00	11.75	Silicon Graphics (H)	25.50	0.63	2.5
OTC	39.13	21.13	Sun Microsystems Inc.	26.63	-0.38	-1.4
NYS	50.75	24.63	Tandy Corp.	46.63	3.13	7.2
OTC	6.75	2.50	Zeos International Ltd.	3.75	-0.13	-3.2

Large Systems — UP 2.53%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
ASE	8.50	4.38	Amdahl Corp.	7.13	0.38	5.6
NYS	7.25	3.63	Convex Computer	6.63	0.00	0.0
OTC	4.88	1.88	Cray Computer	2.63	0.13	5.0
NYS	31.50	20.38	Cray Research Inc.	31.50	4.75	17.8
NYS	13.88	7.75	Data General Corp.	8.25	-0.63	-7.0
NYS	49.25	30.25	Digital Equipment Corp. (L)	30.50	-1.25	-3.9
NYS	49.25	33.88	Harris Corp. (H)	48.38	0.25	0.5
NYS	60.00	40.63	IBM	57.88	2.50	4.5
OTC	25.75	5.25	Kendall Square Research	6.63	0.00	0.0
NYS	150.50	87.25	Matsushita Electronics (H)	150.50	9.50	6.7
OTC	19.25	12.75	NetFrame	16.50	0.25	1.5
OTC	26.00	9.25	Parallan Computer	13.00	0.75	6.1
OTC	23.25	11.25	Pyramid Technology	14.50	-0.50	-3.3
OTC	23.38	11.25	Sequent Computer Sys.	15.50	0.63	4.2
OTC	6.00	1.75	Sequoia Systems Inc.	5.56	0.94	20.3
NYS	41.25	20.25	Stratus Computer Inc.	28.75	-1.88	-6.1
NYS	14.25	8.50	Tandem Computers Inc.	13.63	0.00	0.0
OTC	30.00	10.63	TriCord Systems	22.13	-2.13	-8.8
NYS	13.88	9.88	Unisys Corp.	13.25	0.63	5.0

Software — UP 0.95%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
OTC	37.00	16.25	Adobe Systems Inc.	30.50	1.50	5.2
OTC	27.75	13.50	Aldus Corp. (H)	26.25	0.00	0.0
OTC	8.88	5.13	American Software Inc.	5.88	-0.13	-2.1
OTC	28.13	8.13	Ask Computer Systems (L)	8.38	-1.38	-14.1
OTC	56.75	37.00	Autodesk Inc.	49.50	5.50	12.5
OTC	4.50	2.38	Bachman Info. Systems	3.13	-0.25	-7.4
OTC	41.00	24.00	BGS Systems Inc.	25.50	-1.50	-5.6
OTC	78.00	38.75	BMC Software Inc.	64.25	1.63	2.6
OTC	28.25	20.38	Boole & Babbage	25.13	-0.13	-0.5
OTC	27.25	12.75	Borland Int'l Inc.	14.13	-0.50	-3.4
OTC	4.63	2.75	CE Software	3.31	0.06	1.9
ASE	40.25	16.41	Cheyenne Software Inc.	36.88	4.75	14.8
OTC	13.38	6.00	Cognos Inc. (H)	13.25	1.25	10.4
NYS	44.88	21.88	Computer Associates (H)	38.13	0.25	0.7
NYS	6.25	2.13	Computervision Corp.	3.75	0.00	0.0
OTC	33.50	19.25	Compuware Corp.	31.75	0.75	2.4
OTC	12.00	5.75	Comshare Inc. (H)	12.00	0.50	4.3
OTC	22.00	5.75	Corel Corp.	20.25	-0.75	-3.6
OTC	14.50	3.38	Easel Corp.	4.50	0.75	20.0
OTC	25.50	8.75	Filenet Corp. (H)	22.50	-1.88	-7.7
OTC	25.00	15.75	4th Dimension	21.25	-1.63	-7.1
OTC	17.50	5.25	Frame Technology	10.88	0.75	7.4
OTC	17.00	7.00	Group I Software	9.25	-1.75	-15.9
OTC	35.25	13.50	Gupta	23.75	-0.50	-2.1
OTC	12.00	6.13	Hogan Systems Inc.	10.13	0.63	6.6
OTC	29.50	11.25	IMRS (H)	27.13	-0.63	-2.3
OTC	44.75	27.00	Information Resources	36.13	-0.88	-2.4
OTC	27.25	13.38	Informix Corp.	16.25	-1.25	-7.1
OTC	13.00	8.50	Intergraph Corp.	10.88	0.25	2.4
OTC	12.13	4.88	Interleaf Inc.	7.50	-0.38	-4.8
OTC	14.75	4.75	Intersolv Inc.	11.63	-0.38	-3.1
OTC	18.75	7.75	Knowledgeware Inc.	16.25	0.50	3.2
OTC	54.75	15.50	Legent Corp.	29.63	1.13	3.9
OTC	61.38	22.38	Lotus Development	57.38	1.63	2.9
OTC	23.00	4.25	MathSoft	6.88	0.38	5.8
OTC	15.75	4.50	McAfee Associates	9.00	-0.25	-2.7
OTC	15.50	7.88	Mentor Graphics	13.13	0.75	6.1
OTC	43.63	13.13	Micro Focus	15.50	-0.88	-5.3
OTC	11.50	4.38	Micrografx Inc.	10.50	0.50	5.0
OTC	98.00	70.38	Microsoft Corp.	85.00	-1.25	-1.4
OTC	37.75	13.31	Oracle Corp.	32.75	-0.88	-2.6
OTC	44.75	22.50	Parametric Technology	34.25	-0.50	-1.4
OTC	40.50	23.50	Peoplesoft	31.63	-0.50	-1.6
OTC	6.00	3.50	Phoenix Technologies	4.63	0.00	0.0
OTC	53.00	22.00	Powersoft (H)	53.00	3.88	7.9
OTC	39.75	10.75	Platinum Software	14.25	2.00	16.3
OTC	22.75	7.25	Platinum Technology	10.88	-0.25	-2.2
OTC	60.25	32.25	Progress Software Corp.	39.00	1.25	3.3
OTC	4.25	1.94	Quarterdeck Office Sys.	2.16	-0.16	-6.8
OTC	32.00	16.00	Rainbow Technologies Inc.	19.50	-0.25	-1.3
OTC	11.38	4.25	Rasterops	8.25	1.25	17.9
OTC	15.25	4.50	Ross Systems (L)	5.00	-1.50	-23.1
OTC	28.75	17.50	Sapiens Intl. Corp. N.V.	20.00	2.00	11.1
OTC	9.13	3.13	Softkey Software Products	4.69	0.31	7.2
OTC	14.50	5.50	Software Publishing Corp.	7.63	0.00	0.0
OTC	17.25	6.38	Software Toolworks Inc.	9.50	0.38	4.1
OTC	2.88	1.19	Spinnaker Software	2.13	0.19	9.6
OTC	13.75	6.25	State of the Art	7.25	-0.63	-7.9
NYS	34.50	17.63	Sterling Software Inc. (H)	34.25	-0.13	-0.4
OTC	21.63	11.88	Struct. Dynamics Research	14.00	1.50	12.0
OTC	47.13	23.88	Sybase Inc.	45.25	-0.25	-0.5
OTC	20.50	9.25	Symantec Corp.	14.63	-0.88	-5.6
OTC	52.75	25.75	SynOpsys	45.00	-0.88	-1.9
OTC	24.25	10.00	System Software Assoc.	13.50	-0.63	-4.4
OTC	6.75	2.88	Trinzic Corp.	5.88	-0.13	-2.1
OTC	26.50	13.50	ViewLogic Systems	24.50	0.75	3.2
OTC	12.50	5.50	Walker Interactive Systems	11.00	0.00	0.0
OTC	21.00	14.00	Wang Laboratories Inc. (H)	21.00	2.00	10.5
OTC	2.88	0.84	Wordstar	1.38	0.06	4.7

Semiconductors — OFF 1.50%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
NYS	32.88	16.75	Advanced Micro Devices	20.50	1.38	7.2
NYS	28.00	15.50	Analog Devices Inc.	25.13	-0.63	-2.4
OTC	38.63	15.50	Atmel Corp.	36.25	-1.63	-4.3
OTC	7.25	2.75	Chips and Technologies	5.75	-1.25	-17.9
OTC	42.00	13.00	Cirrus Logic (H)	41.13	-0.63	-1.5
NYS	16.75	9.38	Cypress Semiconductor Corp.	15.63	1.00	6.8
NYS	19.00	11.75	Dallas Semiconductor	17.00	0.13	0.7
OTC	74.50	42.75	Intel Corp.	65.00	0.00	0.0
NYS	19.38	10.25	LSI Logic Corp. (H)	18.75	-0.13	-0.7
OTC	26.75	12.25	Lattice Semiconductor	14.75	-0.13	-0.8
NYS	63.63	19.25	Micron Technology	57.50	0.38	0.7
NYS	107.50	51.25	Motorola Inc.	101.13	-0.50	-0.5
NYS	21.75	10.13	National Semiconductor	17.88	-0.50	-2.7
OTC	14.50	6.50	Sierra Semiconductor	8.38	0.25	3.1
NYS	84.25	50.50	Texas Instruments	71.00	-1.75	-2.4
OTC	18.88	6.50	VLSI Technology	11.38	-1.00	-8.1
OTC	14.38	5.13	Weitek	9.25	-0.25	-2.6
ASE	13.13	3.63	Western Digital Corp.	11.50	-0.75	-6.1
OTC	54.50	26.75	Xilinx	51.00	0.00	0.0
OTC	40.75	19.00	Zilog Inc.	34.00	0.50	1.5

Peripherals and Subsystems — OFF 0.37%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
OTC	24.75	10.50	American Power Conversion	21.75	-0.75	-3.3
OTC	24.25	15.50	BancTec Inc.	22.50	0.75	3.4
OTC	14.25	3.50	Cambex Corp.	4.13	-0.13	-2.9
ASE	18.25	3.88	Cognitronics Corp.	4.25	-0.31	-6.9
NYS	24.38	9.00	Conner Peripherals	15.50	-0.50	-3.1
OTC	39.25	17.50	Creative Technologies Inc. (H)	34.25	-2.25	-6.2
OTC	30.00	6.50	Data Race Inc.	9.38	-1.38	-12.8
ASE	12.13	7.50	Dataram Corp.	8.50	0.50	6.3
NYS	21.00	5.13	EMC Corp.	20.38	1.13	5.8
OTC	8.25	5.25	Emulex Corp.	7.13	0.38	5.6
OTC	21.00	14.00	Evans & Sutherland	21.00	1.75	9.1
OTC	20.25	7.50	Exabyte (H)	19.50	0.88	4.7
OTC	34.00	17.50	Intelligent Info. Systems	23.75	-0.25	-1.0
OTC	6.50	2.38	Iomega Corp.	2.63	-0.13	-4.5
OTC	9.75	5.75	IPL Systems Inc.	9.25	0.50	5.7
OTC	24.00	13.75	Komag Inc.	17.75	0.50	2.9
OTC	11.38	4.38	Maxtor Corp.	5.63	-0.13	-2.2
OTC	9.63	5.75	Micropolis Corp.	6.25	-0.25	-3.8
NYS	117.00	97.88	3M Corp	107.25	-4.50	-4.0
OTC	9.50	6.25	Printronix Inc.	7.63	-0.63	-7.6
NYS	17.25	7.50	QMS Inc.	8.63	-0.25	-2.8
OTC	17.63	9.38	Quantum Corp.	16.25	0.25	1.6
OTC	9.13	3.13	Radius Inc.	7.75	-0.50	-6.1
NYS	17.75	11.75	Recognition Equipment	13.88	-1.13	-7.5
OTC	7.63	3.63	Rexon Inc.	6.00	0.25	4.3
OTC	26.00	13.13	Seagate Technology	24.63	1.88	8.2
NYS	45.00	18.00	Storage Technology	34.38	-0.38	-1.1
NYS	28.25	21.38	Tektronix Inc.	28.25	2.13	8.1
NYS	93.50	69.88	Xerox Corp. (H)	92.38	-0.63	-0.7

Services — UP 1.34%

Exch	52-Week Range		Company	Jan. 28 3 PM	Wk Net Change	Wk Pct Change
OTC	23.75	14.88	American Mgmt. Systems	19.88	0.63	3.2
NYS	4.25	2.38	Anacomp Inc.	3.63	-0.13	-3.3
OTC	23.50	15.75	Analysts Int'l	16.50	0.25	1.5
NYS	56.88	46.88	Auto Data Processing	53.75	0.88	1.7
NYS	22.88	13.00	Ceridian Corp. (H)	22.88	2.00	9.6
NYS	23.50	13.88	Comdisco Inc. (H)	23.38	0.25	1.1
OTC	13.38	6.16	Computer Horizons	12.63	0.13	1.0
NYS	34.13	23.34	Computer Sciences	34.13	2.38	7.5
NYS	9.00	6.00	Computer Task Group	6.88	0.00	0.0
NYS	35.00	17.38	CompUSA Inc. (L)	17.75	-0.88	-4.7
OTC	14.13	8.75	Control Data Systems Inc	10.00	0.88	9.6
OTC	16.00	7.00	Corporate Software	14.63	-0.38	2.5
OTC	10.25	6.63	Egghead Discount Software	9.25	0.38	4.2
NYS	35.38	26.00	General Motors E (EDS)	29.13	-0.25	-0.9
OTC	25.50	12.75	Inacom Corp.	18.25	3.88	27.0
OTC	28.00	12.00	Intelligent Electronics	26.50	0.25	1.0
OTC	19.00	9.75	Merisel	18.38	0.88	5.0
OTC	28.84	7.16	Microage Inc.	27.75	1.50	5.7
OTC	40.25	23.00	Paychex (H)	40.00	1.50	3.9
NYS	87.25	21.63	Policy Management Sys.	33.00	0.00	0.0
NYS	45.88	28.00	Reynolds and Reynolds	44.50	0.25	0.6
OTC	28.50	13.38	SEI Corp	25.25	0.00	0.0
OTC	26.00	17.50	Shared Medical Systems	24.63	0.75	3.0
OTC	12.63	6.25	SHL Systemhouse	6.25	-0.50	7.4
OTC	30.75	17.50	Software Spectrum Inc.	17.50	5.75	24.7
OTC	42.75	28.00	Sungard Data Systems	39.75	0.50	1.2

KEY: (H) = New annual high reached in period (L) = New annual low reached in period

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INDUSTRY PULSE: Semiconductors

Top U.S. suppliers invest the most capital...

Company	1993* Revenues	1993* Capital expenditures
Intel Corp.	$7.84	$2,006
NEC America, Inc.	$6.44	$482
Motorola, Inc.	$6.01	$973
Toshiba Corp.	$5.87	$519
Hitachi America Ltd.	$4.74	$409

(FIGURES IN MILLIONS)

*1993 estimated capital expenditures include buildings, plants and land acquired by the companies to produce semiconductor products.

Source: VLSI Research, Inc., San Jose, Calif.

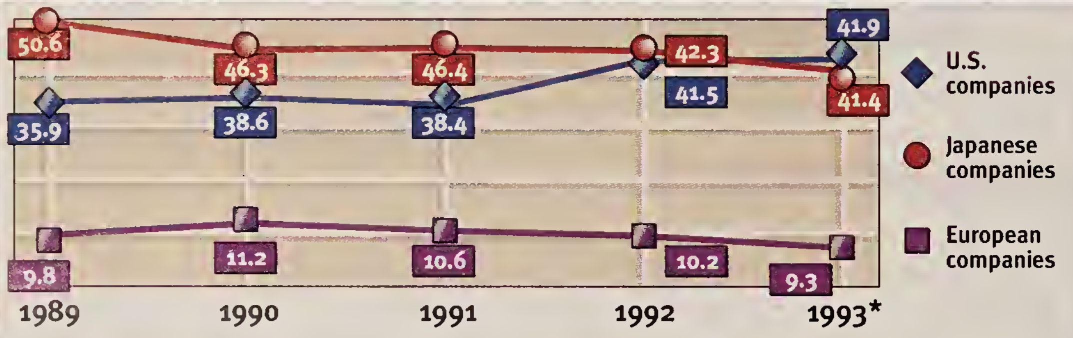
...taking advantage of healthy book-to-bill ratios...

	October	November	December
1989	0.93	0.93	1.00
1990	0.96	0.93	1.00
1991	0.96	1.01	1.07
1992	1.11	1.13	1.11
1993	1.00	0.99	1.04*

Book-to-bill ratio refers to the average ratios of new orders to shipments. *Preliminary. January 1993 recorded the year's high: 1.20.

Source: Semiconductor Industry Association, San Jose, Calif.

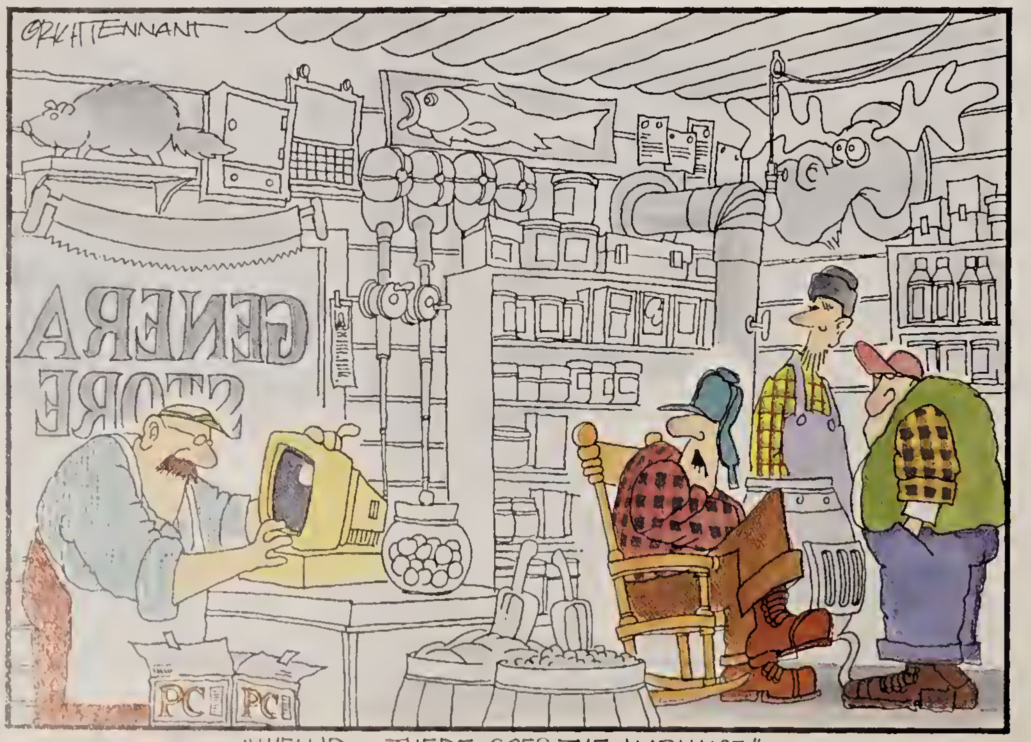
...aiding increasing worldwide market share.



*Preliminary estimates listed for 1993. IBM figures were not added to the U.S. percentage in 1993 so a valid year-to-year comparison could be made.

Source: Dataquest, Inc., San Jose, Calif. (December 1993)

The 5th Wave *by* Rich Tennant



"WELL'P — THERE GOES THE AMBIANCE."

Inside Lines

Hubba, hubba!

Cabletron Systems next week will unveil its next-generation, 10-module switching hub, which it is billing as the first true packet-switching hub. Currently known as Super MMAC, the hub will be based on an application-specific chip set developed with LSI Logic and Intel that incorporates all switching functionality into hardware. This reportedly results in dramatically improved packet transmission speeds. According to Cabletron, the hub will have 6G bytes of total switching bandwidth, and each module will be able to transmit up to 400,000 packets per second at one-tenth the cost of today's high-end routers.

Fattening the F line

IBM plans this week to expand the AS/400 line with the addition of the Model F97. According to industry sources, the four-processor machine is expected to perform about 25% faster than the existing F95 quad system and support twice as much memory capacity and users as the F95. The F97 processor will likely be used in some of the G-series models due out in May, according to analysts.

Technological signposts

Banyan plans in the next couple of weeks to ship a commercial version of a redirector that lets Windows NT clients access its Vines network operating system, according to Banyan executive Bill Johnson. Included in the announcement will be software to allow Vines clients to access NT application servers and SQL Server via Vines Internet Protocol. Also on tap: equivalent support for Novell UnixWare.

On the money

Priscilla Tate, former executive director of the Microcomputer Managers Association, will next month launch a for-profit organization called the Technology Managers Forum International. The nonprofit association will essentially become a regional user group, while the New York-based forum will use its for-profit staff to create a worldwide organization for corporate IS managers.

Get the picture?

PictureTel is working with Microsoft to link the Office Manager in Microsoft's Office with its desktop videoconferencing package. Once completed, Office users will be able to invoke PictureTel's desktop video software.

Watching the manufacturing stream flow

Dun & Bradstreet Software this week will detail plans for adding manufacturing planning software to its SmartStream client/server line, although shipments are not scheduled until the third quarter. D&B said it will combine Manufacturing Stream and a factory-floor package from another vendor under a common graphical-user interface by year's end. Manufacturing Stream will deliver work-flow capabilities off the bat.

Novell last week fired off an indignant reply to a recent Microsoft memo that disparaged Novell DOS 7 and Personal NetWare. Novell denies Microsoft's claim that it has been positioning Personal NetWare as a universal network client, which would put it nose-to-nose with Microsoft's Workgroup for Windows. Microsoft honcho Rogers Weed counters that Novell fired off a data sheet on CompuServe claiming that Personal NetWare is the only "universal network client" around. Microsoft also criticized Novell's concept of workgroups of up to 50 Personal NetWare clients, which can freely access servers within their own group but must log on separately to NetWare Directory Services or another workgroup to access outside servers. Novell countered that Microsoft forces Word for Windows clients to log on to each server separately, just to see what is available. Weed conceded that separate log-ons are needed to actually access server resources, but not for browsing. Phone, fax or CompuServe News Editor Alan Alper with news tips or spats at (800) 343-6474, (508) 875-8931 or 76537,2413, respectively. Or try Computerworld's *24-hour voice-mail tip line at (508) 820-8555.*

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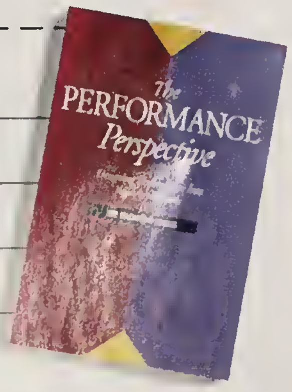

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